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January 31, 2014

Mr. Dan Hall
Manager, Ground Water Section
Utah Division of Water Quality
195 North 1950 West, Third Floor
Salt Lake City, Utah 84116

Re: Transmittal of Ground Water Discharge Permit Application; Solutions Ponds and Tailings Disposal Facility; CS Mining, LLC

Dear Mr. Hall:

Attached please find two copies of the subject application.

We would appreciate the Division's timely review of this application.

Please contact me or CS Mining's consultant, Mr. Bob Bayer (801-561-4286 or 801-560-9709) with questions. Bob will be in contact to arrange a meeting with you and appropriate staff soon to discuss our plans for ongoing expansion. We look forward to working with you and your staff in completing this permitting effort.

Sincerely,

David McMullin
Vice President and General Manager

Enclosures
Copies: Russell Alley, CS Mining
Ron Wunderlich, CS Mining
Bob Bayer

GROUND WATER DISCHARGE PERMIT APPLICATION

for

CS Mining, LLC

Solution Ponds and Intermediate Tailings Disposal Facility Project

January 30, 2014

Prepared for

CS MINING, LLC
1208 S. 200 W., P.O. Box 608
Milford, UT 84751

Prepared by

R.J. Bayer Professional Geologist, LC
8842 Shady Meadow Drive
Sandy, UT 84093

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1. Introduction

CS Mining LLC is expanding its copper mining and beneficiation operation in Beaver County, Utah. This expansion includes new plant facilities that will be supported by solution ponds and a new tailings impoundment that require a Utah Ground Water Discharge Permit in accordance with the Rule R317-6, Ground Water Quality Protection. This document is intended to meet the requirements for a Ground Water Discharge Permit Application under Rule R-317-6-6.

2. Background Information

In 2008, a predecessor to CS Mining acquired approximately 11,440 acres of mixed private, Federal, and State lands located approximately seven miles northwest of Milford, Beaver County, Utah. This land encompasses various current and historic copper-bearing open pit copper mines and underground mine workings (DOGM Notice of Intention to Commence Large Mine Operations M/001/0067). CS Mining proposes to increase economic viability of its mining operations by continuing to expand its mining activities and constructing an acid-leach and counter-current decantation (CCD) plant along with a solvent extraction and electrowinning (SX/EW) plant. These additional facilities will enable CS Mining to produce copper cathode as well as copper concentrates; the latter will continue to be sold to a toll smelter. The tailings residue will be placed in a lined tailings facility (the Intermediate Tailings Disposal Facility or ITDF) to be located east of the existing mill site. The acid-leach and SX/EW plants will require up to 3 solution storage ponds, which will be lined and have leak detections systems. A Utah Ground Water Discharge Permit (GWDP) is sought for the ITDF and the 3 solution ponds.

3. Administrative Information

3.1. Applicant Name and Address

CS Mining, LLC
1208 S. 200 W., P.O. Box 608
Milford, UT 84751

3.2. Contact Information

Phone: (435) 378-5053
Fax: (435) 387-5088
Attn: David McMullin, VP and General Manager

3.3. Authorized Company Representative

David McMullin, Vice President and General Manager, is duly authorized to represent CS Mining, LLC, with regard to this application for a groundwater discharge permit for the Intermediate Tailings Disposal Facility (ITDF).

3.4. Facility Legal Location

The proposed tailings facility will be located in the SW ¼ of Section 5, SE ¼ of Section 6, NE ¼ of Section 7, and NW ¼ of Section 8, Township 27 South, Range 11 West, Salt Lake Base & Meridian. The 3 solution storage ponds will be located in the NW ¼ of Section 7 in the same township. All sections are located in Beaver County, Utah. The Universal Transverse Mercator Geographic Coordinate System (UTM) coordinates for the facility are: Zone 12 Northing 4261885, Easting 314950. Figure 1 is a project and general facilities location map.

4. General Information

4.1. Owner and Operator Information

The owner and operator information is the same as the applicant information: CS Mining, LLC is the owner and operator for this facility.

4.2. Facility Information

Solution Ponds and Intermediate Tailings Disposal Facility (ITDF)
CS Mining, LLC
Milford, UT

4.3. Contact Information

The Contact information is the same as listed in Section 3.2 above.

5. Facility Location, Type, and Classification

The ITDF will be used to store reject material from CS Mining's copper processing facility, which is described in detail in Section 6, Mine Operation and Processing Description. The proposed tailings pond will be located on privately owned land approximately nine miles northwest of Milford, Beaver County, Utah (Figure 1), and is located as described in section 3.4. The ITDF footprint is approximately 80 acres.

5.1. Facility Classification

The ITDF and the 3 solution ponds will be new, to-be-constructed facilities.

5.2. Type of Facility

The new facilities for which a Ground Water Discharge Permit is sought will be the 3 solution storage ponds and a new tailings pond. The facilities will store solutions and tailings as part of CS Mining's new copper cathode production facilities. Production of cathode copper begins following crushing and grinding with separation of acid-leachable ore from sulfide ore through the flotation process. The floatable ore, primarily sulfides, are dried and sold as concentrates. The ore that does not float, the underflow from the flotation tanks, contains non-sulfide (oxide) copper minerals that are acid soluble. Acid leaching produces a pregnant leach solution (PLS), which is stored in the PLS pond prior to processing with solvent extraction. Following solvent extraction, the dissolved copper-bearing liquids are processed in the electrowinning circuit, in

which copper cathodes are produced. The liquid remaining after solvent extraction is called raffinate and is stored in the raffinate pond to be recycled for reuse in the acid leach process.

A third solution pond will also be constructed. It will be used for additional raffinate storage to accommodate future production increases and, if constructed prior to plant expansion, will provide added solution storage capacity in the event that repairs to one of the two primary ponds require it be taken out of service. The third pond may not be constructed immediately; however, it is the intent that this application includes a third pond to be located adjacent to the two currently proposed ponds, as described in sections 6.3 and 10.1.

5.3. SIC/NAICS Codes

The Standard Industrial Classification (SIC) and North American Industry Classification System (NAICS) codes that describe the proposed facility are 1021 (SIC) and 212234 (NAICS) for copper ores mining and/or beneficiating.

5.4. Project Facility Life

The expected life of the ITDF is 4 to 8 years. The solution ponds are anticipated to be used for a longer time period, up to 20 years, as ore reserves are increased and additional future tailings storage capacity is established. A larger tailings facility will be designed and constructed in the future; however, that facility is not part of this application.

6. Issued and Pending Permits

6.1. Permit History

Division of Water Quality Permits

CS Mining's predecessors, Western Utah Copper Company (WUCC) obtained a Permit by Rule from the Division of Water Quality (DWQ) on October 5, 2009 for the Flotation Tailings Pond (FTP) located south of the existing Mill Facility. On June 7, 2012, CS Mining received approval from the DWQ to use the FTP. The letter, dated June 7, 2012 from Woodrow Campbell to Ron Wunderlich, gives a chronological summary of events for the review and approval process. This letter can be found online in the Division's database. DWQ recently approved, in a letter dated September 30, 2013 from DWQ Director Walt Baker to Mr. Ron Wunderlich of CSM, a construction permit for expansion of the flotation tailings pond. This permit was issued under the existing Permit-by-Rule for the pond.

DOGM Permits

CSM currently has a permit for Large Mining Operations (LMO) with the Division of Oil, Gas and Mining (DOGM), M/001/067. The permit includes mining copper ore with open-pit mining methods, beneficiation via flotation to produce copper concentrate, and the flotation tailings pond. Two amendments to the LMO have been approved by DOGM in late 2013 to include the Sunrise mine pit, waste dump, and haul road.

CSM has several exploration permits with DOGM in and surrounding the Project area:

E/001/0159	Copper Ranch Exploration Project
E/001/0172	Bawana/Sunrise Exploration Project
E/001/0177	Maria Pit Exploration Project
E/001/0178	Candy B Exploration Project
E/001/0180	OK Mine Exploration Project

DOGM also has had one Small Mine Permit, S/001/0076, for the Bawana Low Grade Ore Piles; however, it will "rolled into" the LMO, M/001/067.

Air Quality Permits

Air Quality Approval Order (AO) DAQE-AN142190002-12 was approved on August 2, 2012.

BLM

BLM has approved a revised Plan of Operations for the Sunrise mine area and as part of that process prepared an Environmental Assessment (EA) under the National Environmental Policy Act (NEPA). The EA did not address the effects of the current or planned tailings management or beneficiation operations because those existing and proposed facilities are not and will not be located on federal land.

To date, there have been six EAs prepared by the BLM for projects related to CSM's operations in this area. The EAs are:

DOI-BLM-UT-C010-2013-0053-EA December 2013 – Hidden Treasure Mine – Amendment 3

DOI-BLM-UT-C010-2012-0020-EA September 2012 - Hidden Treasure Mine

DOI-BLM-UT-C010-2009-0054-EA September 2009 - Sunrise Exploration Project

DOI-BLM-UT-C010-2009-0061-EA August 2009 - Bawana Stockpile Removal

DOI-BLM-UT-C010-2009-0027 January 2009 - Copper Ranch Exploration

EA UT-040-06-34 September 2008 - Candy B Exploration

6.2. Pending Permits

CS Mining is currently in the process of revising its Notice of Intent (NOI) for Large Mine Operations (LMO) with DOGM (M/001/067). Amendments to this NOI have recently been approved by DOGM, as noted above. The pending revision will address those proposed facilities described in this application document, including the proposed new plant facilities, process ponds and the tailings impoundment. Once approved by DOGM, this document will be placed on the DOGM online database.

A Notice of Intent Modification Application has been prepared and was submitted to the Division of Air Quality (DAQ) in December 2013. This modification addresses the operations set forth in application as well as new or expanding mine facilities and haul roads. The application is currently under review by the DAQ.

7. Mine Operation and Beneficiation Description

7.1. Mining

CSM currently mines copper and magnetite ore in 3 open pits, the Hidden Treasure, Bawana, and Sunrise (Figure 1). The sequence in which they are mined is based upon the copper grade requirements of the mill; mining may occur in more than 1 pit at a time in order to meet mill feed requirements. Additional mineral deposits in the project area are anticipated to be developed in the near future. Ore produced from these pits will be milled and further beneficiated in the existing and proposed plant facilities and disposed in the ITDF. Waste rock removed from the pits is placed in adjacent waste dumps. Ore from the pits is trucked to the milling facility.

7.2. Mill/Concentrator

The mill facility consists of a crushing and grinding area with a dirt/gravel floor, and a flotation mill and recovery section, with a concrete floor. The entire facility has underlying concrete footings. The facility also includes chemical storage and conditioning tanks.

The concentrating activities are crushing, grinding, flotation, and filtration, which results in a copper concentrate, magnetite concentrate and tailings. The mill is capable of operating 24 hours per day, 7 days per week.

The primary crusher is a jaw crusher which crushes the rock to ¾-inch minus. The secondary crushing circuit consists of a series of 2 cone crushers which take the rock to minus 10 mesh. The minus 10 mesh to plus 60 mesh goes to the ball mill to be ground to 150-200 mesh. The minus 60 mesh from the secondary crusher will go directly to flotation. The capacity of the primary and secondary crushing circuits will be 3500 tons per day initially and shortly increased to 7000 tons per day. The ball mill capacity will be expanded to match the capacity of the crushers.

After the ore is ground in the ball mill, it goes to magnetic separation. The magnetite is stockpiled in anticipation of its sale to an end user. If it is not sold, the magnetite concentrate will be processed through the acid leach circuit for copper recovery.

The non-magnetic material moves to the conditioning, reagent, and mixing circuit, where it flows by gravity tank-to-tank, and then into the flotation and thickening circuit. The concentrate is then skimmed off and filtered before being shipped via truck as a concentrate to offsite facilities for further processing.

Flotation agents are added to the ground ore in the flotation circuit in an aerated water suspension. The flotation process uses two general types of froth flotation reagents: frothers, which aid in stabilizing the bubbles that form the froth, and "promoters" (also termed "collectors"), which enhance the effectiveness of flotation of specific minerals. The formulation of the flotation reagents used depends upon the specific mineralogy of the ore being processed. Reagents are used in concentrations generally less than 1 percent by volume, with typical concentrations estimated to be 0.5 percent. The flotation reagents, by design, preferentially accumulate ore minerals and as a result are removed with the froth that contains the copper

minerals and, therefore, accumulate with the concentrate following the flotation process. Thickened concentrates are dewatered through filtration and dried prior to shipping to an offsite smelter. The filtrate solution, including most of the flotation reagents, is recovered and returned to the mill circuit. Only minor amounts of reagents remain in the concentrates and tailings. Table 1 is a list of reagents used in the mill facility.

Table 1. List of Reagents used in Ore Beneficiation

Common Name	Industry Name	Circuit	Notes
Bentonite clay		Solvent Extraction	Crud treatment and clean up of organic phase
AERO® MX 935 Promoter	Modified dithiophosphate mixture	Flotation	Mineral promoter/collector
FLOMINC 4343	Sodium alkyl monothiophosphate	Flotation	Mineral collector
FLOMIN F 500 Frother	Methyl Isobutyl Carbinol (MIBC)	Flotation	Frother
TPH C40A	Polydiallydimethylammonium chloride	Flotation	Coagulant
Sodium hydrosulfide solution	Same	Flotation	Collector
Orform R (PAX)	Potassium Amyl Xanthate	Flotation	Collector
TPH A940	Anionic Emulsion Co-polymer	Flotation	Flocculent
CS Mining Copper Concentrate	Copper Concentrate	N/A	Product
Sulfuric acid (90-98%)	Same	Acid Leach	Acid
SuperFloc□ A-1883RS	Anionic polyacrylamide in water-in-oil emulsion	Acid Leach	Flocculent
3M Acid Mist Suppressor FC-1100	Fluroalkyl Acrylate Adduct	Solvent Extraction	Suppressor
ACORGA M5640X Solvent Extraction Reagent	Salicylaldoxime derivative	Solvent extraction	Extractant
Calumet 400-500 Solvent	Hydrotreated light petroleum distillate	Solvent Extraction	Solvent
Penreco® 170ES	Hydrotreated light petroleum distillate	Solvent Extraction	Solvent
Anionic polyacrylimide, PAM	Hydrotreated Distillate, Light C9-16	Solvent Extraction	Solvent
ShellSol D70	Same	Solvent Extraction	Organic diluents for extractant

7.3. Acid Leach and Solvent Extraction/Electrowinning

After the acid leach circuit and related facilities are built, the tailings from the flotation circuit will be transported via pipeline to the proposed acid-leach/counter-current decantation (CCD) circuit where it will undergo leaching with a sulfuric acid solution. The resultant copper-bearing pregnant leach solution (PLS) will be stored in the PLS pond before being processed in the adjacent SX/EW circuit. Solvent extraction is a process that reacts the copper-bearing weak acid solution with an organic solvent similar to kerosene. The reaction process effectively replaces the copper in the acid solution with hydrogen ion from the organic solvent. In turn, the copper is complexed with the organic solvent. When the extraction to organic solution is completed, the copper is then extracted from the organic solvent using a concentrated sulfuric acid solution, resulting in dissolved copper sulfate. This acid solution is processed electrochemically, in a process known as electrowinning, which results in electroplating to produce copper metal cathodes. The cathodes will be shipped and sold to metal brokers or other end users.

Design drawings for the acid leach and SX/EW circuits are contained in Appendix A. The drawings shown in the appendix are proprietary and marked business confidential. Drawing 00-GA-01 is a general arrangement and site plan for the acid leach and SX/EW facilities. As the drawing shows, the new facilities will be installed immediately to the west of the existing flotation mill. The acid-leach feed thickeners will be located adjacent to the mill. All of the facilities will be located on patented mining claims (fee land). From east to west, the major facility components are: the acid leach feed thickeners, the acid leach circuit and adjacent acid storage tanks, the CCD circuit, the SX circuit and the adjacent tank farm where solvents for the solvent extraction process are stored, and the electrowinning circuit and cathode handling facility. Initially a single train of 7 leach tanks will be installed for the acid-leach circuit; however, a second train may be added in the future. Similarly the initial CCD circuit will have a single 4-tank train with the addition of a second train planned in the future. Either 2 or 3 lined solution storage ponds will be constructed, as shown on Drawing 00-GA-01. One pond will contain PLS and 1 or 2 ponds will contain raffinate. Initially a single raffinate pond will be constructed. A second pond may be constructed if necessary in the future. Each pond is approximately 2.2 acres in area.

Process flowsheets for the leach/CCD, SX and electrowinning circuits are provided on drawings 60-FS-01, 30-FS-01, and 40-FS-O1, respectively (Appendix A). The leach process begins with the delivery of thickened acid leach feed from the thickeners to the leach circuit along with raffinate (recycled leach solution depleted of metals in the SX circuit) and sulfuric acid to adjust the pH in the first leach tank. Leaching of flotation tailings takes place as they flow through a series of 7 agitated leach tanks at progressively lower rates with addition of acid at each tank to maintain proper pH before flowing to the CCD tanks where pregnant (metal-bearing) solution is progressively separated from the solids by counter-current decantation, and sent to the PLS pond. The solids, tailings, from the CCD circuit are then pumped to the ITDF. From the PLS, pregnant solution is pumped through the SX circuit. The metal laden solvent is then reacted with concentrated sulfuric acid (in the tank farm area) where metal is separated from the solvent

after which the acid solution is pumped to the electrowinning circuit where copper cathodes are produced.

The following drawings for the principal facilities discussed above are provided in Appendix A:

62-GA-01 Acid Storage Tank Layout

60-GA-01 Leach Circuit Tanks Layout

61-GA-01 CCD Thickeners Circuit Layout

61-GA-01 CCD Thickener Circuit Section

30-GA-01 Solvent Extraction Unit Layout

40-GA-01 Electrowinning Unit Layout

50-GA-01 Tank Farm Unit Layout

Both the acid solutions and the organic solutions are recycled.

Tailings are separated from the PLS in the CCD circuit (see drawing 60-FS-01 in Appendix A). Tailings are estimated to be generated at a rate of approximately 350 gpm and contain 54% solids. No other waste streams will be sent to tailings.

A material termed crud remains following solvent extraction. Crud is the term used for the solid stabilized emulsion which collects in the settlers of solvent extraction (SX) facilities. The crud phase contains fine suspended solids, recoverable organic solvent, trapped air, gypsum, and debris that enters the open SX tanks. The crud is treated for recovery of the organic contents for re-use in the solvent extraction process. The final treatment step is filtration using either diatomaceous earth or a clay material (see flow sheet on Drawing 30-FS-01 in Appendix A). Following this step recovered solvent is returned to the solvent extraction circuit and the solids remaining after filtration are disposed offsite in accordance with its waste characteristics.

The concrete foundations for all proposed new structures are designed to contain 110 percent of the volume of the largest tank in the event of a spill. Any spills will be returned to the process circuit from which they were released or discharged to the raffinate pond.

The PLS and raffinate pond designs are depicted in a series of drawings included in Appendix B:

80-GA-01 PLS and Raffinate Pond Layout

80-GA-02 Ponds Sections and Details

80-GA-03 Solution/Leak Recovery Sections and Details

80-GA-04 Solution/Leak Recovery Plan and Notes

80-GA-05 Solution/Leak Recovery Sections and Details

The ponds will be designed to contain the designated solution quantities as well as the appropriate design direct precipitation component. The ponds will be bermed and will collect no runoff from the surrounding area. The solution ponds will contain a primary and secondary (composite) liner with a leak detection system.

Further details of the pond liners and leak detection systems are described in Section 10, Design Report.

7.4. Tailings Management and Tailings Characteristics

Currently flotation tailings are sent to the existing tailings pond located approximately 800 feet south of the mill. The proposed ITDF will be located to the east of the beneficiation facilities in two small drainages. The location of the ITDF is shown of Figure 1.

7.4.1. Flotation Tailings

The 25.80-acre flotation mill tailings pond was constructed at the location of a dry tailings disposal facility that was permitted by rule on October 5, 2009 under Utah's Ground Water Quality Protection Rules. CSM received a construction permit for this facility from the Division on October 11, 2011, and it was subsequently reissued on November 11, 2011. Most recently, a construction permit for expansion of the Flotation Tailings Pond was issued (September 30, 2013) for a 10 raise of the tailings dike to provide increased in capacity using upstream construction methods to allow for additional storage capacity while the acid leach circuit and associated tailings pond are constructed. Once the acid leach circuit is completed, the flotation tails will be extracted from the existing tailings pond and sent through the leach/SX/EW circuit and then to the ITDF.

Flotation tailings characteristics have been described in past data submittals that supported the current Permit-by-Rule for the Flotation Tailings Pond. No approvals relative to the Flotation Tailings Pond are being sought by CSM as part of this Application.

7.4.2. Intermediate Tailings Disposal Facility

The proposed tailings pond (or ITDF) for the acid-leach and SX/EW operation will be located in two small canyons east of the current milling operations (Figures 1, 2). The tailings pond will have two dams and a capacity of approximately 3 million cubic yards. Design information for the 2 ponds is provided in Appendix B. Dam construction borrow will come from unconsolidated alluvium and weathered bedrock in both drainages and from the bedrock ridge located between the drainages. Weathering and fracturing of the granitic bedrock will allow this material to be ripped and no blasting is contemplated. Construction will commence with the eastern dam with much of the borrow material derived from the intervening ridge. Construction of the southeastern pond is scheduled to begin in mid Q2 of 2014. These ponds are anticipated to have a life of 4 to 8 years and will allow ongoing production while design and permitting of a larger tailings impoundment is carried out.

Both dams will have a final crest elevation of 5,860 feet AMSL. The eastern dam will have a maximum downstream toe-to-crest height of approximately 160 feet. The western dam will have a maximum downstream toe-to-crest height of approximately 80 Feet.

As tailings begin to fill the eastern part of the ITDF, construction of the western starter dam will commence. Construction will proceed sequentially between the two dams as the containment capacity is increased over the life of the impoundment. Following construction of starter dams,

the dams will be raised in 10-foot increments raises will be constructed with borrow filled (from within the impoundment's ultimate footprint) using upstream methods, building upon tailings beaches formed by selective tailings deposition along the dams' upstream sides. In order to ensure a stable foundation on which to place the raise fills, a geofabric will be placed over the tailings beach prior to fill placement.

Containment of tailings liquids will be enhanced by installation of liner system. A 40-mil HDPE liner will be installed over the drainage bottoms and in those parts of the impoundment where water separated from the tailings will pond. A geocomposite liner (GCL) will cover the upper margins of the impoundment. Upon completion of ITDF construction, approximately 80 percent of the impoundment will be lined with HDPE.

The ITDF will not have a leak detection system.

7.4.3. ITDF Ground Water Monitoring

As discussed in Section 9.0, the ground water in the form of a water table aquifer is not known to be present beneath the ITDF site. The relatively localized granitic bedrock, small watershed area, and low precipitation rate combine to suggest this is may be the case. A 200-foot drill hole adjacent to the southeastern damp outslope location encountered fractured granodiorite (refer to Section 9.0). Nevertheless, a monitor well will be installed adjacent to the toe of each dam.

These wells will be 8-inches in diameter, 500 feet in depth and completed with 4-inch casing and well screen for monitoring and pumping purposes. Whether or not ground water is encountered, the wells be equipped with a dedicated pump and equipped with an electronic pressure transducer to enable sampling and to measure the hydrostatic head in the well, respectively. The monitor well below the eastern starter dam will be installed as soon as practicable following beginning of dam construction. The well will be completed and sampled before tailings are place in the ITDF. The same approach will be taken with the monitor well to be installed below the western starter dam.

The elevation of the potentiometric surface in the well would be measured and recorded weekly. If water is present in the well, baseline water quality samples would be collected. Wells would be appropriately purged before sampling, samples would then be collected, preserved in appropriate sample containers and stored on ice or in refrigeration until delivery, under chain of custody to a Utah-certified analytical laboratory. The samples would be analyzed for the following parameters: pH and electrical conductivity (both in the field and in the lab); total dissolve solids (TDS); alkalinity; major ions (calcium, magnesium, sodium, potassium, sulfate, nitrate and nitrite, chloride); trace metals (for which Utah has established standards); and radionuclides (radium 226 and 228, gross alpha). Samples would be collected at the same time from water supply well WW-6 located approximately one-half mile south of the ITDF. Samples from the monitor well(s) and WW-6 will be collected quarterly for 2 quarters after which the baseline water quality for the well(s) would be reported to the Division. Thereafter, monitoring would continue on a quarterly basis with results reported to the Division quarterly.

Because the quality of tailings water is very similar to that of some ground water in the area, determining whether or not there has been an impact from leakage from the tailings pond may be difficult. CSM will work closely with the Division to assess whether or not the quality of any water beneath the pond has been impacted by a release of water from the ITDF. If it is determined that ground water quality is being affected by release of water from the tailings pond, the 4-inch well(s) will be used as recovery wells and water will be returned to the tailings pond. If it is determined that the capacity of a single 4-inch well cannot recover sufficient water to offset the rate of release, an additional well or a larger diameter well or both would be installed to enable water released from the ITDF to be pumped back to the pond.

Depending on the depth of water in the well, the submersible pump may or may not be able to lift the water from the water table to the tailings pond. If that is the case, either a larger capacity pump and well would be installed or an intermediate pump station would be installed at the toe of the dam to transfer water from the well head to the pond, which will require lifting against a head of 120 feet.

The combination of the liner system, placement of tailings in the ITDF which will retard water from reaching the liner, and the relatively short facility life (4 to 8 years) combine to create a very low potential for a leak escaping the pond to reach any water table under the largely unsaturated flow conditions that will exist beneath the ITDF.

7.4.4. Acid-leach/SX Tailings Characteristics

Bench-scale acid leach and solvent extraction testing was carried out by McClelland Laboratories in Reno, Nevada during 2013. A composite bulk sample was collected from the flotation tailings pond. Because flotations tailings will feed the acid-leach/SX/EW plant, the bulk sample is representative of the feed to the new plant.

The test replicated expected operating conditions with continuous acid addition and a 3-hour leach cycle at ambient temperature. Figure 3 is a flow diagram for the bench-scale test. Testing begins with the addition of tailings (T1) and sulfuric acid (A1) to the first of the 6 agitated leach tanks. Tailings move sequentially through the agitated leach tanks with acid added in each tank to maintain the necessary pH. Following leaching the liquids and solids from the leach circuit (T7) are separated in the CCD thickener train with the PLS going to solvent extraction (OF4) and the solids representing the tailings (UF 4) that would be pumped to the ITDF. Note that the flow from the SX cell does not segregate PLS and raffinate since electrowinning is not part of the bench test; therefore, no environmental analyses were performed on the discharge from the SX vessel (OF5). The tailings collected from the bench test (UF4) were sampled for characterization in terms of chemistry and mineralogy.

Characterization of the acid leach and SX/EW tailings has been completed using residue from the bench-scale testing conducted at McClelland Laboratories. Samples were analyzed using several test methodologies: total concentrations of 48 elements using inductively coupled plasma/mass spectroscopy (ICP/MS) analysis; elemental and ionic analysis of extracts from the

Meteoric Water Mobility Procedure (MWMP) and the Synthetic Precipitate Leach Procedure (SPLP); acid-base accounting (ABA) using the modified Sobek Method, and mineralogical and modal analyses. This information is summarized here and provided in full in Appendix C.

Table 2 provides a summary of the tailings characterization testing. As these data indicate, the MWMP results showed an exceedance of a single Utah Ground Water Quality Standard (antimony @ 0.019 mg/l) and had total dissolved solids (TDS) concentration of 2400 mg/l; no other Ground Water Quality Standards or Class designations were exceeded in the MWMP extract. The SPLP results found no detectable concentrations of any metals of concern (Appendix C). As the water quality data in water supply well #6 indicate (Appendix D), TDS in ground water in the area is relatively high, 1760 mg/l. Well #6 is the closest well to the ITDF and is approximately one-half mile downgradient (south) from the toe of the planned TDF dam.

ABA tests on the tailings sample indicated a relatively high net neutralizing potential (NNP) and a paste pH test of the sample had a pH just above neutral.

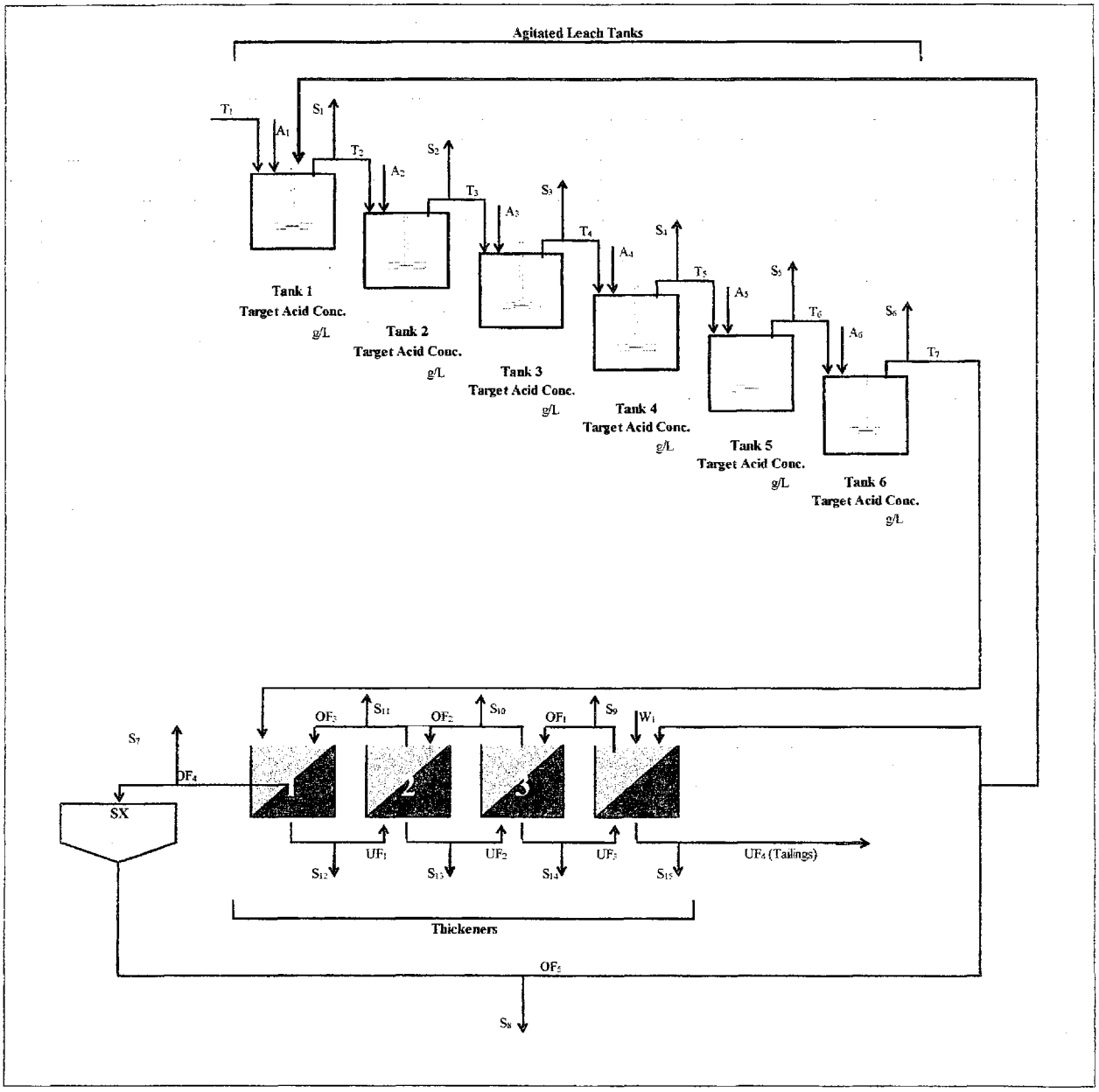

Figure 3. Acid-leach/Solvent Extraction Bench Test Flow Diagram

Mineralogical analyses were accomplished using x-ray diffraction and scanning electron microscopy (QEMSCAN). Results of these analyses are provided in Appendix C. These results indicate that the mineralogy of the tailings sample is dominated by silicate and oxide minerals and low sulfide and carbonate concentrations. Neutralization of the tailings occurs in the CCD circuit where hydrogen ions are consumed by calcium carbonate minerals, resulting in their dissolution and then the eventual precipitation of calcium as the sulfate gypsum. Ferrous iron compounds may also neutralize acidity in the tailings.

Table 2. Summary of Acid-Leach/SX-EW Tailings Characteristics
(complete analytical reports in Appendix C)

Data Type	Lab	Data			
Acid/Base Accounting	SVL Analytical	pH	Acid Generating Potential (AGP) – Tons $CaCO_3$	Acid Neutralizing Potential (ANP) – Tons $CaCO_3$	NNP– Tons $CaCO_3$
		7.75	<0.3	48.5	48.5
MWMP	Wet Labs	Notable Results (mg/L)			
		pH = 7.37	TDS = 2400	Sb = 0.019 (exceeds UT GWQ std. of 0.006)	Other Trace Metals - Non-detectable
		Ca = 550	SO_4 = 1,500		
SPLP	Wet Labs	Notable Results (mg/L)			
		Ca = 580	SO_4 = 4,000 mg/kg – note units		
		Trace Metals - Non detectable			
ICP/MS	ALS Minerals	Refer to Appendix C for Results			
Mineralogy (XRD)	ALS Metallurgy	Results (percent)			
		Sulfides	Iron Oxides	Silicates	Sulfate (gypsum)
		0.6	22.0	68.0	5.4
		Carbonates	Others		
		0.6	3.4		

8. Water Information

8.1. Climate

The entire Great Basin has an arid climate. Information on temperature and precipitation for the Milford area, as compiled by the Western Regional Climate Center is shown in Table 3.

8.2. Area Surface Water

The facility is located in the Beaver River drainage basin, which drains into the Sevier River. There are no single main channels through the area; instead, the runoff is dispersed and distributary. There are five springs in the Beaver Lake Mountains, all located to the north of the ITDF. The nearest mapped spring or seep is approximately 2 miles north of the ITDF (Bogley 2013). There are no Drinking Water Protection Zones or wellhead protection areas in the state database for Beaver County (Utah DDW 2013). The nearest perennial stream is a section of

The Big Wash, 3.3 miles south of the of common section corner of sections 5, 6, 7, and 8; the Beaver River is 5.8 miles east of the same common section corner (USGS 2013).

Table 3. Milford, Utah Monthly Climate Summary

Period of Record : 11/1/1906 to 3/31/2013

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)	39.1	45.5	54.6	63.9	73.8	84.5	92.1	89.7	80.7	67.8	52.5	41.3	65.5
Average Min. Temperature (F)	13.5	19.6	25.4	31.6	39.3	46.9	55.8	54.1	43.8	32.6	22.2	14.9	33.3
Average Total Precipitation (in.)	0.65	0.79	1.03	0.86	0.73	0.46	0.72	0.84	0.68	0.92	0.64	0.77	9.09
Average Total Snow Fall (in.)	6.7	5.7	6.6	3.1	0.9	0	0	0	0.1	1.1	3.5	6.3	34.1
Average Snow Depth (in.)	2	1	0	0	0	0	0	0	0	0	0	1	0

Percent of possible observations for period of record.
Max. Temp.: 94.9% Min. Temp.: 94.9% Precipitation: 80.9% Snowfall: 78.4% Snow Depth: 76.7%

Source: Western Regional Climate Center, 2013 (http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?ut5654)

8.3. Well and Spring Identification

8.3.1. Wells

There are eight water rights associated with CS Mining; all for underground water wells. Table 4 lists the water right information for water rights associated with CS Mining.

Associated with these water rights are three wells; Well #3 (71-4396, 71-4773, 71-5052, 71-5327), Well #6 (71-4783), and the Truck Shop well (71-4396, 71-5111). Additionally there are four former monitor wells near the facilities area (USGS 2013, UDWR 2013). Well locations are shown on Figure 1.

Table 4. Water Right Information for Water Rights associated with CS Mining

Water Rights Number	Source	Point of Diversion Location	Acre feet
71-4396	Underground Water Well	N 380 ft E 1090 ft from SW cor, Sec 31, T 26S, R 11W; S 100 ft W 650 ft from NE cor, Sec 7, T 27S, R 11W; N 943 ft E 1438 ft from SW cor, Sec 8, T 27S, R 11W; S 1600 ft W 300 ft from NE cor, Sec 20, T 27S, R 11W; N 2010 ft W 945 ft from SE cor, Sec 34, T 27S, R 11W; S 1650 ft W 2300 ft from NE cor, Sec 34, T 27S, R 11W	546.23
71-4763	Underground Water Well	N 460 ft W 4435 ft from SE cor, Sec 6, T 27S, R 11W; N 943 ft E 1438 ft from SW cor, Sec 8, T 27S, R 11W; S 924 ft W 628 ft from N4 cor, Sec 16, T 27 S, R 11W; N 510 ft W 472 ft from SE cor, Sec 20, T 27S, R 11W; N 1085 ft E 603 ft from SW cor, Sec 20, T 27S, R 11W; S 379 ft E 4187 ft from NW cor, Sec 20, T 27S, R 11W; S 1681 ft W 698 ft from N4 cor, Sec 21, T 27S, R 11W; S 148 ft E 380 ft from NW cor, Sec 22, T 27S, R 11W	50.00
71-4772	Underground Water Well	S 450 ft E 1140 ft from N4 cor, Sec 9, T 27S, R 13W	217.33
71-4773	Underground Water Well	S 450 ft E 1140 ft from N4 cor, Sec 9, T 27S, R 13W	1.73
71-4783	Underground Water Well	S 100 ft W 650 ft from NE cor, Sec 7, T 27S, R 11W; S 2585 ft W 3353 ft from NE cor, Sec 7, T 27S, R 11W; S 1220 ft E 750 ft from NW cor, Sec 8, T 27S, R 11W	253.56
71-5052	Underground Water Well	N 490 ft W 4435 ft from SE cor, Sec 6, T 27S, R 11W	50.00
71-5111	Underground Water Well	S 40 ft E 1320 ft from N4 cor, Sec 12, T 28S, R 11W; S 50 ft E 70 ft from N4 cor, Sec 12, T 28S, R 11W; S 2600 ft W 1330 ft from NE cor, Sec 12, T 28S, R 11W	3.00
71-5327	Underground Water Well	N 943 ft E 1438 ft from SW cor, Sec 8, T 27S, R 11W; S 100 ft W 650 ft from NE cor, Sec 7, T 27S, R 11W; N 380 ft E 1090 ft from SW cor, Sec 31, T 26S, R 11W; S 450 ft E 1140 ft from N4 Sec 9, T 27S, R 11W	50.00

8.3.2. Springs

There are five springs located in the Beaver Lake Mountains and none in the Rocky Range. They are located in Table 8.1-1(Bogley 2013). The spring closest to the CSM operation is Brownfield Canyon Spring, located in Brownfield Canyon approximately 3 miles north of the ITDF and would not be influenced by the proposed facilities. All of the other springs listed in Table 5 are located further to the north of the proposed facilities, as the latitudinal information in the table demonstrates.

Table 5. Springs in the Beaver Lake Mountains

Spring Name	ID Name (USGS)	Location (Lat/Long)	Flow
West Spring	NA	38.533890, -113.127220	NA
Douglas Spring	NA	38.531110 -113.110830	NA
Bardsley Spring	NA	38.527500 -113.109720	NA
Smith Spring	NA	38.526110 -113.103890	NA
Brownfield Tunnel Spring	NA	38.516110 -113.116390	NA

(Bogley 2013)

8.4. Surface Water Body Identification

There are no Surface Water Bodies located within two miles of the Medium Tailings Facility (USGS 2013).

8.5. Drainage Identification

Numerous, unnamed, intermittent drainages have been located within two miles of the ITDF. These drainages are shown on Figure 1.

8.6. Well-head Protection Area Identification

There are no Well head Protection Areas located within five miles of the ITDF or the solution ponds locations (UDDW 2013).

8.7. Drinking Water Source Identification

There are no Drinking Water Sources located within five miles of the ITDF or the solution ponds locations (UDDW 2013).

8.8. Well Logs

Well logs for WW #3, WW #6, and the Truck Shop well are located in Appendix E. According to the well logs, WW #3 was drilled to a depth of 680 feet, and encountered water at 186 feet below the surface; WW #6 was drilled to a depth of 560 feet, and encountered water at 96 feet below the surface; the Truck Shop well was drilled to a depth of 875 feet, and encountered water at 295 feet below the surface. Further information on ground water is provided in section 9.4.

9. General Discharge Identification

Neither the solution storage ponds nor the ITDF are designed to discharge; they are designed as zero-discharge facilities.

The solution ponds are designed to be constructed above the natural grade of the surrounding terrain with a berm of approximately 6 feet (refer also to section 6.3). Diversion berms channeling upland flow to the west and east of the plant and pond areas will be included in the final design drawings and shown on the SWPPP that is in draft now. However, the containment systems for the ponds (elevated berms) and the concrete containment walls for each of the new beneficiation plant components will provide back-up capability for preventing runoff from impacting any of the proposed facilities. The solutions ponds will be double lined with a leak detection layer beneath the entire upper liner, as described in section 6.3. Any significant leaks will be identified in a timely manner and repaired. As a result, there are no planned or reasonably potential discharges from the solution ponds.

The ITDF will be lined and no tailings discharge is planned or anticipated. Should tailings liquids escape the liner, the monitor wells below the tailings dams will identify any significant quantity of water. The monitor wells are described in section 6.4.3.

If tailings water were to be released due to a leak in the tailings pond liner, the water would have characteristics similar to those of the bench-scale test results described in section 6.4.3.

10. Geology and Hydrogeology

10.1. Regional Geology and Landform

The project area is located within the Basin and Range Physiographic Province in west-central Utah. This province owes its name to the general geologic history common to this part of the country that has given rise to the present-day landscape of alternating generally north-south trending fault-block mountains and intervening valleys or basins. Prior to development of the basins and ranges igneous rocks of latest Mesozoic to Tertiary age intruded the early Mesozoic and Paleozoic sedimentary rocks that had been folded and faulted during the Cretaceous Sevier Orogeny. Volcanic rocks were deposited over much of the region during the mid-to late Tertiary age.

10.2. Project Area and Local Geology

The geology in the project area is dominated by both intrusive and extrusive igneous rocks. Late Paleozoic rocks (Permian) are exposed in limited areas except in the vicinity of the ore deposits currently being mined or to be mined in the near future. A geologic map of the CSM Operations Area is provided on Figure 4.

10.2.1. Ore Deposit Geology

The ore deposits in the Rocky Range occur as skarns, metasomatically altered sedimentary rocks with replacement silicate minerals, abundant marble, and local vein-like concentrations of

copper oxide and lesser sulfide minerals. In 2012, metallurgical and mineralogical tests were performed on samples taken from the Hidden Treasure, Bawana, and Sunrise deposits. The results of these tests reaffirmed historical reports of low to non-existent amounts of pyrite (D. Hartshorn, 2013). Copper in all three deposits is primarily found in the oxide minerals malachite/azurite, cuprite, chrysocolla, and various copper-calcium silicates. Copper sulfide minerals, chalcopyrite, chalcocite, and bornite, occur in lesser quantities. The geology and mineralization in the Rocky Range is described by Whelan (1982). Currently all of CSM's proposed mining activity is planned to occur from deposits in the Rocky Range and in nearby skarn deposits beneath the adjacent pediment.

The OK mine area is located on the southern end of the Beaver Lake Mountains. This part of the range is comprised of tertiary volcanic and the granodiorite intrusive that hosts the OK copper deposit, which occurs in a mineralized breccia pipe (Taylor, 1987) and has been mined out. CSM will process the ore in a low-grade stockpile remaining from OK mine production.

10.2.2. Geology of the Proposed Plant Area and the ITDF

Geologic mapping by the USGS of the Milford 15-minute quadrangle is available as an Open-File Report (Lemmon and Morris, 1979). A geologic map of the entire project area is shown on Figure 4 and a geologic map of the greater plant area and the ITDF area is shown on Figure 5. No faults have been recognized in the area of the ponds or the ITDF. As the geologic map on Figure 5 shows, the solution ponds and the ITDF will be constructed in an area underlain by Quaternary alluvium and the unnamed Tertiary granodiorite. Surface geologic mapping, and limited subsurface data from drilling suggest that the area in and around the ponds and the ITDF is underlain by granodiorite bedrock. Subsurface geologic information comes from general knowledge of subsurface geology compiled by successive operators of the current CSM mines, drillers logs from water production wells, a geologic log of a monitor well boring adjacent to the lab facility as well as some recent subsurface investigations associate with ITDF design. Despite probable erroneous labeling of rock type as "dolomite" in the driller's logs for 2 of the production wells, it seems clear that the ground water in the vicinity of the proposed facilities occur in relatively intensely fractured granodiorite. It is reasonable to conclude that wells completed in fractured granodiorite are the source of the water used by CSM in its mining and beneficiation operations.

No exploration drill holes for which geologic logs are available are known in the vicinity of the proposed new facilities. Driller's logs, but no geologic logs are available for the water supply wells. A geologic log of one of the former monitor well (MW-1) is also available. This log and the drillers logs are provided in Appendix E.

As part of the pre-dam design geological and geotechnical investigations, test pits, 3 shallow core holes, and a deeper, 200-foot core hole were drilled. Figure 6 shows the location of test pits and core holes relative to the toe of the ITDF dam. In addition, seismic investigations were performed to assess the extent of fracturing in the subsurface in the granodiorite.

Test pits encountered the following typical profiles:

- 0 to 1.0 feet of topsoil

- 2.0 to 8.5 feet of unconsolidated alluvium often grading to a residuum of highly weathered, texture-less granodiorite
- Up to 2.5 feet of weathered, friable granodiorite with the texture preserved
- Hard, slightly weathered granite was encountered at a depth of approximately 2 feet in 1 test pit

Logs of representative test pits are provided in Appendix F and their locations are shown on Figure 6.

A single shallow core hole (B-3) was drilled in the drainage at the eastern dam site encountered unconsolidated sediments and weathered granodiorite over highly fractured granite to a depth of approximately 50 feet. The other core holes, B-1 and B-2, were drilled on the ridge dividing the two subdrainages in which the ITDF will be constructed (Figure 6).

Two seismic surveys were carried out. The objective of the surveys was to assess changes in the relative intensity of fracturing in the granodiorite using the seismic refraction method. Measuring the return velocities of compression waves (p waves) allows the depth to refracting horizons along with the thickness and velocities of overlying horizons to be estimated.

One of the surveys was used in combination with several shallow core holes to assess the condition of the bedrock forming the ridge between the 2 adjoining drainages that will form the ITDF. The combination of the drilling and seismic work demonstrated that the bedrock forming the ridge is weathered and fractured to sufficient depth to enable it to be used as construction material for the starter dam in the east drainage. The design engineers estimate that this borrow material will be susceptible to ripping with large dozers and that little or no blasting will be required. The results of this survey are not described further herein.

The second seismic survey was conducted in the location of the eastern starter dam. The report in this seismic survey is provided in Appendix G. The survey was conducted along the ephemeral drainage beneath the location of the eastern tailings starter dam. A 700-foot-long line was run adjacent to a road that roughly parallels the drainage channel. Three lines slightly less than 400 feet long were run perpendicular to the longer line. All of the lines indicate increasing seismic velocity with depth. The three shorter lines indicate shallower low-velocity surficial cover on their eastern ends, which reflects the thinner cover on the steeper eastern slope. In all of the seismic profiles the lowest velocity layer (green in color) has an estimated thickness of 20 to 30 feet, which is approximately the thickness of surficial alluvium and highly weathered granodiorite observed in core holes drilled in the footprint of the eastern tailings dam, as discussed below. Although the seismic survey results showed increasing velocity with depth, the maximum estimated depth observed was approximately 100 feet (Appendix G). Increasing velocity in the granodiorite reflects less fracturing and in turn decreasing secondary porosity.

The 200-foot boring (ITDF Test Boring) is located approximately at the intersection of seismic lines 1 and 3 (map on page 2 of the seismic survey report in Appendix G near the planned location of the ITDF eastern starter dam toe (Figure 6). The core hole was drilled in order to characterize the nature of the bedrock, including rock type, hydrothermal alteration, fracturing,

rock quality data (RQD) and evidence of faulting. A geologic and geotechnical log of the core hole is included in Appendix F. A summary of the gross lithology, fracture density and RQD for ITDF-0 is shown on Figure 7. The RQD for the interval 130 to 200 feet indicates poorer rock quality than is depicted in the upper 130 feet. Similarly, fracture density is greater in the interval from 130 to 200 feet than it is in the upper 130 feet. Because the fracture density did not diminish with depth, it is reasonable to assume that intense fracturing is likely to continue for an unknown distance below the depth of 200 feet. This observation is reflected in the proposed monitor well depth discussed in section 6.4.3.

10.3. Project Area Hydrogeology

Limited ground water data is available for the CS Mining project area as a whole. Figures 1 and 4 show the water supply wells used by CSM. Data available for these wells include drillers logs for the water supply wells (WW-3, WW-6, Truch Shop Well); however, they are not available for the monitor wells located immediately south of the flotation tailings pond and adjacent to the CSM laboratory. Geologic logs are not available for the water supply wells; however a geologic log is available for one of the monitor wells. Logs are provided in Appendix E.

According to records from previous site operators now in the possession of CSM, monitor wells that were installed downgradient of the formerly proposed heap leach pad and what is now the flotation tailings pond had an average depth to ground water of approximately 167 feet when they were drilled and they were completed in granodiorite/quartz monzonite. The rock type is confirmed in the geologic log of MW-1 in Appendix E.

Knowing what we do about the project area geology and the occurrences of water, we know that ground water in the project area is unconfined. From the driller's logs we know the depth of water in the wells and the static water level in the well bore when the wells were drilled. However, wells are too widely separated to use water levels in these wells to determine the hydraulic gradient over the greater project area. In fact, there is no evidence of hydraulic connectivity among the wells, although it is likely that the aquifers encountered in WW-6, the lab area monitor wells and the Truck Shop Well are connected to some degree. Nevertheless, it is very probable that the ground water table gradient in the vicinity of the solution ponds and ITDF sites is to the south reflecting the surface topography.

Recent historic water level data is available for WW-6; however, this data for WW-3 appears corrupted. Table 6 summarizes the available water level information from the 3 water supply wells.

Table 6. Water Level Information – Water Supply Wells

Well Designation	Collar Elevation	Total Depth	Static Water Level on Completion		Static Water Level – Fall 2013	
	(Feet AMSL)	(Feet)	Depth (Feet)	Elevation (Feet AMSL)	Depth (Feet)	Elevation (Feet AMSL)
WW-3	6640	680	186	6454	No data	No data
WW-6	5590	560	96	5494	314	5276
Truck Shop Well	5230	875	295	4935	No data	No data

Well WW-6 was completed in September 2008 per the driller's log (Appendix E) and in Fall 2013 production from the well had lowered the water level in the well approximately 218 feet from the static level at completion.

Drawdown in WW-6 would result in an increased hydraulic gradient between any ground water beneath the ITDF and this water supply well. Ongoing production from WW-6 will have the effect of causing ground water in the surrounding area to flow toward that well instead of flowing along the presumed water table gradient to the south.

The United States Geological Survey has compiled and interpreted available ground water data for the Milford area (Mason, 1998). Figure 8 is excerpted from that professional paper. As the map on that figure shows, the CSM project area is more than 5 miles from the nearest production well used in the USGS study. The geological and hydrogeological data for the project area described above clearly demonstrate that the project area is not located on basin fill, unlike the wells used as part of the USGS study.

10.4.Surface and Ground Water Quality

There is no surface water in or around the project area.

Ground water quality data for production wells WW-3 and WW-6 are shown in Table 7. TDS concentrations are 1410 and 1760 mg/L, respectively for the 2 wells. As such the ground water would be classified as Class II under the Utah Ground Water Protection Rules. Otherwise, ground water quality is unremarkable with pH near neutral and background trace metal content low, with most analytical results being at or near the lab detection limit.

Table 7. Ground Water Quality Data Summary

SUU Water Lab Data					
	Well #3		MRL*	Well #6	
Parameter	Result	Units		Result	Units
pH	6.72	SU	4	7.36	SU
Arsenic	<5	µg/L	10	<5	µg/L
Barium	0.014	mg/L	0.005	0.029	mg/L
Beryllium	ND	mg/L	0.001	ND	mg/L
Cadmium	<1	µg/L	1	<1	µg/L
Chromium	ND	mg/L	0.005	ND	mg/L
Copper	<50	µg/L	50	<50	µg/L
Lead	5.66	µg/L	5	<5	µg/L
Mercury	ND	mg/L	0.0002	ND	mg/L
Nickel	<10	µg/L	5	<10	µg/L
Selenium	<5	µg/L	5	<5	µg/L
Thallium	ND	µg/L	2	ND	µg/L
Fluoride	<0.4	mg/L	0.4	0.435	mg/L
Sodium	65.8	mg/L	5	81	mg/L
Sulfate	700	mg/L	5	798	mg/L
Nitrate	0.313	mg/L	0.1	<0.1	mg/L
Nitrate+ Nitrite Total	0.313	mg/L	0.1	<0.1	mg/L
Nitrite	<0.1	mg/L	0.1	<0.1	mg/L
Total Dissolved	1410	mg/L	20	1760	mg/L

GE Water & Process Technology Data			
	Well #3	Units	Well #6
Parameter	Result		Result
Specific Conductance	2220	µmhos	2560
Alkalinity as $CaCO_3$	297	ppm	84
Sulfur	528	ppm	697
Chloride	236	ppm	364
Hardness, Total as CaCO3	1090	ppm	1260
Calcium Hardness	810	ppm	893
Magnesium Hardness	279	µg/L	364
Copper	<0.05	ppm	<0.05
Iron	<0.05	ppm	<0.05
Sodium	68	ppm	89
Potassium	2	8.4	798
Phosphate, Total, as PO_4	<0.4	ppm	<0.4
Phosphate, Ortho, as PO4	0.2	ppm	0.2
Silica, as SiO_2	19.6	ppm	25

11. Solution Pond and ITDF Design Report

Detail design and construction permit application materials are nearly complete and Construction Permit applications for both the solution ponds and the ITDF will be submitted to the Division very soon. Therefore, the information provided below is summary in nature.

11.1. Solution Pond Design Summary

The raffinate and PLS ponds have the same design and will be the same size. The ponds will have a primary liner of 80-mil HDPE over a geogrid leak detection layer, which will in turn be underlain by a composite liner made up of 60-mil HDPE over compacted clay. The secondary composite liner will be placed on a prepared (graded, scarified, moisture conditioned and compacted) native-earth foundation. The lower part of the composite liner will consist of a 6-inch–thick layer of clay prepared and compacted at optimum moisture content and density to

have a hydraulic conductivity of 10 x 10-7 cm/sec or less. A 60-mil HDPE flexible membrane liner will be installed directly on top of the clay layer. A geogrid will provide the leak detection layer and will be placed directly on the secondary liner. The primary liner will be 80-mil HDPE and will be installed on top of the geogrid. The ponds will slope to the northeast corner then continue along the path of the solution recovery pipe (drawing 80-GA-05 in Appendix B) to the leak detection sump located beneath the adjacent pump station (see drawings 80-GA-04 and 05 in Appendix B). The sump will be gravel-filled and will have a capacity of approximately 600 gallons. The dedicated leak recovery pump will engage automatically when water reaches the top of the well screen (Section B, drawing 80-GA-03 in Appendix B. Water recovered from the sump will flow through a totalizer prior to being discharge back to the pond from which it origninated. Totalizer readings will be recorded daily during scheduled inspections and the volume of water recovered for each day will be recorded. The volume of water removed will be measured and recorded on a daily basis. Each 2.2-acre pond must not leak more than 440 gallons per day in order to remain in compliance with the Division's required maximum daily leakage rate of 200 gallon/acre/day. Leakage rates in excess of this daily limit would be reported to the Division with 24 hours and immediate steps would be taken to reduce the leakage rate, identify the source of the leak, and repair it.

The ponds are designed to contain all un-diverted upland runoff from an appropriate precipitation return event. Berms will surround the ponds to prevent run-on from overland flow from the north and to provide access for operations and maintenance (Pond Section A, drawing 80-GA-01 and 80-GA-02, Appendix B). Average up-gradient berm height will be approximately 6 feet from surrounding natural terrain to the top of the pond berms.

11.2. ITDF Design Summary

Detailed, final design will be done only for the eastern starter dam at this time. The resulting detailed design package will serve as the Construction Permit application for the ITDF as well as the application for a Dam Safety Permit from the Division of Water Rights.

Construction will begin with the eastern starter dam, which will have an elevation of 5820 feet AMSL and a toe-to-crest height of 120 feet (Figure 9). When constructed, the western starter dam will have an elevation of 5830 feet AMSL. The eastern dam will have an ultimate toe to crest height of 160 feet and a final elevation of 5860 feet AMSL. The final western dam will have a lower toe to crest height, but the final elevation will be the same as that of the eastern dam, 5860 feet AMSL. Estimated demand for construction material for the eastern and western starter dams is 403,000 yd3 and 151,000 yd3, respectively. Final dam volumes are estimated to be 457,000 yd3 and 204,000 yd3 for the eastern and western dams, respectively.

The starter dams will have slopes of 3H:1V on the upstream sides and 2H:1V on the downstream side. Raises will have slopes of 2.5H:1V on the downstream sides and 1.5H:1V on the upstream sides. The dams will have crest widths of 20 feet and 2 feet of freeboard will be provided.

The ITDF will have an ultimate capacity to contain 2,564,500 yd^3 of tailings. Tailings will initially be produced at 1500 tons per day (tpd), ramping up to 3000 tpd.

Borrow for the dams will come from unconsolidated alluvial fill and weathered and fractured bedrock within the footprint of the ITDF. In addition, the upper part of the ridge dividing the east and west drainages that will make up the ITDF will be excavated and reduced in elevation to 5815 feet AMSL. The material removed will provide approximately 161,000 yd^3 or about 40 percent of the construction material for the east starter dam. As stated in section 9.5.2, the results of a seismic survey and 2 shallow core holes indicated that the material comprising the upper parts of the ridge can be ripped with a large dozer equipped with ripper teeth.

Borrow is expected to be ripped and then crushed by dozer tracks prior to excavation loading and transport to the dam site. The dam construction material is expected to be 3-inch minus in size. Borrow will be hauled to the dam site in trucks or scrapers and spread with dozers in 12 inch lifts, which will be roller compacted after moisture conditioning.

Subgrade for the lined parts of the impoundment will be graded, moisture conditioned, scarified, and compacted. One-inch minus material will be used as bedding material for the flexible membrane liner, which will be 40-mil HDPE with smooth surface texture. The HDPE will be placed in accordance with manufacturer's specifications approximately 1,100,000 ft^2 of the eastern part of the impoundment will be lined with HDPE following completion of the starter dam. Approximately 400,000 ft^2 of the western part of the impoundment will be lined with HDPE after the starter dam is completed. When the dams are completed to their final design height, an additional 900,000 ft^2 of the impoundment will have been lined with HDPE, bringing the total lined area to approximately 2,400,000 ft^2 or 80 percent of the 60 acre impounded area.

The remaining 20 percent of the impoundment will be lined with GCL, Bentomat ST or the equivalent. The GCL will be installed in accordance with manufacturer's recommendation. HDPE and GCL will be joined by overlapping them in the HDPE anchor trench or placing powdered bentonite when joining the 2 materials in an anchor trench is not possible.

12. Construction Quality Control Plan

Construction quality control plans will be included in the final design packages that will accompany the Construction Permit Application for the solution ponds and ITDF. In general industry standard quality control measures will be taken for each step of construction: grading and foundation preparation; installation of the clay portion of the secondary liner for the solution ponds, installation of flexible membrane liners for both the solution ponds and the ITDF, and all concrete installations, including those intended to contain spills, direct precipitation, or, for the solution ponds, the leak detection sumps.

13. Groundwater Discharge Control Plan

Groundwater discharge will be prevented from occurring from the solution ponds by the liner and leak detection system, making repairs when and if necessary, as determined by the rate at which any leakage reaches the leak detection sumps. CSM believes that the solution pond design is appropriate and that it meets industry standards.

14. Reclamation and Closure Evaluation

All topsoil from the proposed ITDF location will be gathered to a depth of 12 inches where available and placed in a topsoil stockpile to be located south of the western ITDF dam. Approximately, 145,000 cubic yards of topsoil are proposed to be taken from this area and placed in the existing topsoil stockpile for use during reclamation.

Reclamation of the ITDF will begin on the tailings beach. If necessary a geotextile will be first placed on the beach surface as needed for foundation stability on the partially dried tailings surface prior to replacement of topsoil. Approximately one foot of topsoil will be placed on the tailings surface after applying the geotextile when needed. The topsoil will be scarified after placement and reseeded by broadcast methods using the DOGM-approved seed mix.

Solution ponds will be reclaimed by first folding the liners from the pond side walls onto the pond bottoms and then backfilling the ponds with the fill used to create the graded fill on which the ponds were constructed. Approximately one foot of topsoil will be placed on the backfilled ponds. The topsoil will be scarified after placement and reseeded by broadcast methods using the DOGM-approved seed mix.

15. Compliance Monitoring Plan

The solution pond leak detection systems will be regularly monitored and maintained as described in section 10.1. Both the solution ponds and exposed liner in the ITDF will be inspected no less than weekly, damage reported and necessary repairs scheduled for timely completion.

The monitor wells below the ITDF dams will be operated as described in section 6.4.3 and if appropriate will trigger initiation of ground water recovery using the monitor wells (or larger replacement wells as needed) as recovery or pump-back wells to return ground water adversely impacted by release from the tailings pond to the ITDF.

16. References

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FIGURES

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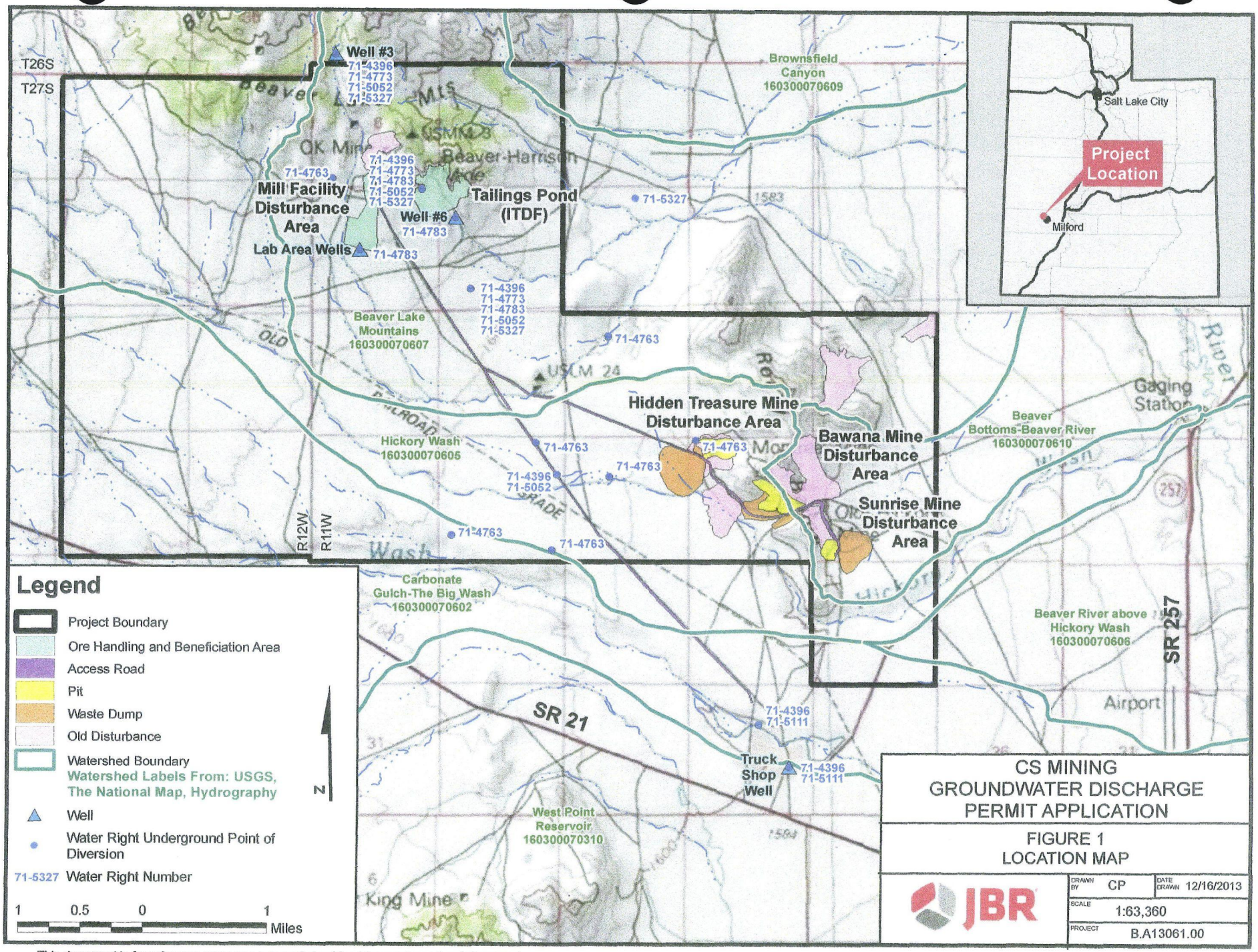

CS MINING
GROUNDWATER DISCHARGE
PERMIT APPLICATION

FIGURE 1
LOCATION MAP

JBR

DRAWN BY	CP
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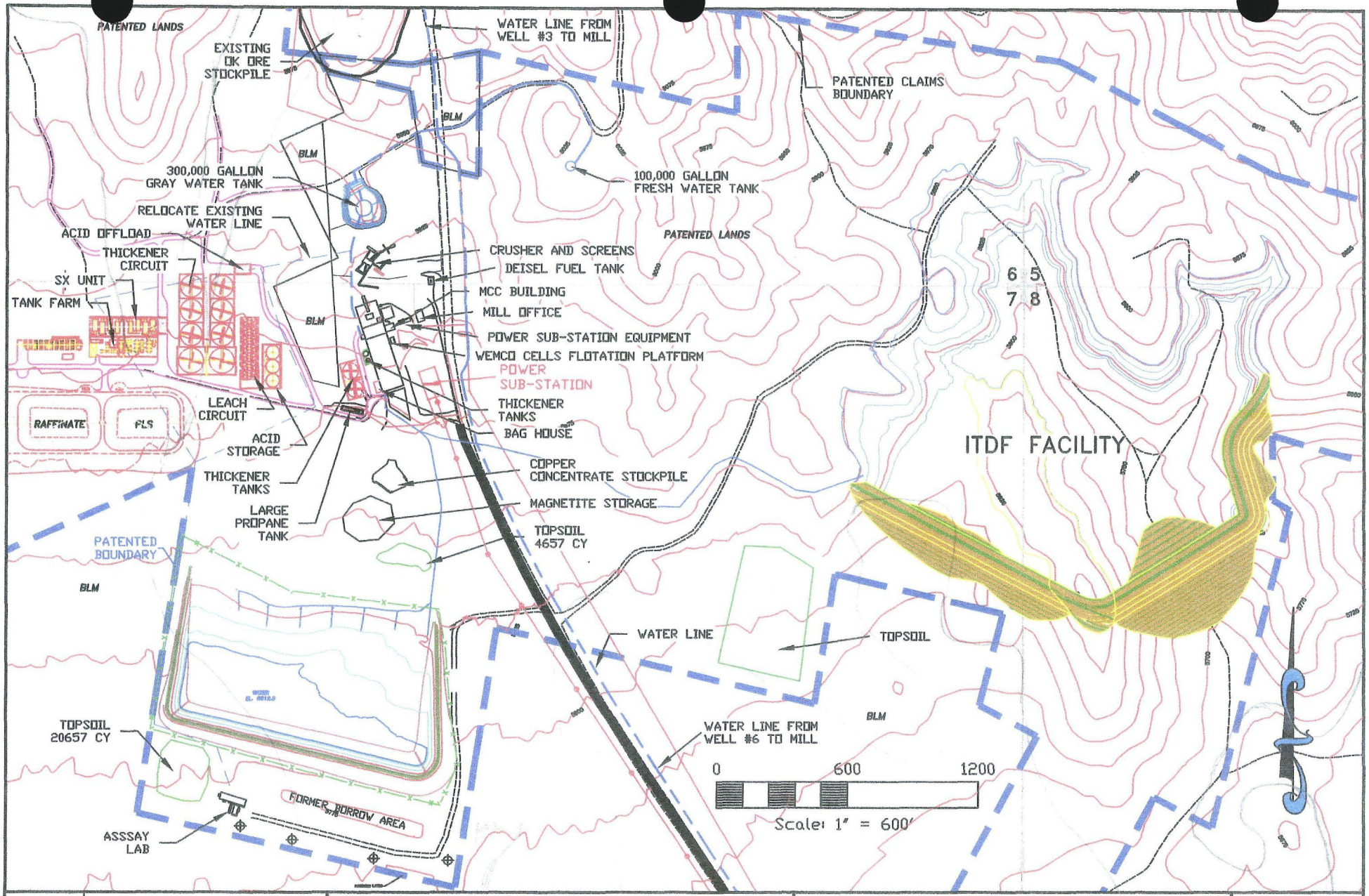
PROJECT	B.A13061.00



DRAWN BY:	D.M. CLARKE
DATE:	12-10-2013
DWG. NO.:	
APPROVED BY:	

ENGINEER:
PLATT & PLATT, INC.
CIVIL ENGINEERS & SURVEYORS
195 N. 100 E., CEDAR CITY, UTAH 84720
435-586-6151
fax 435-586-8567

PROJECT/OWNER:

FIGURE 2 – FACILITIES MAP
CS MINING, LLC
MILLSITE AREA
WITHIN SECTIONS 5,6,7, & 8, T 27 S, R 10 W, SLB&M

SHEET: 2

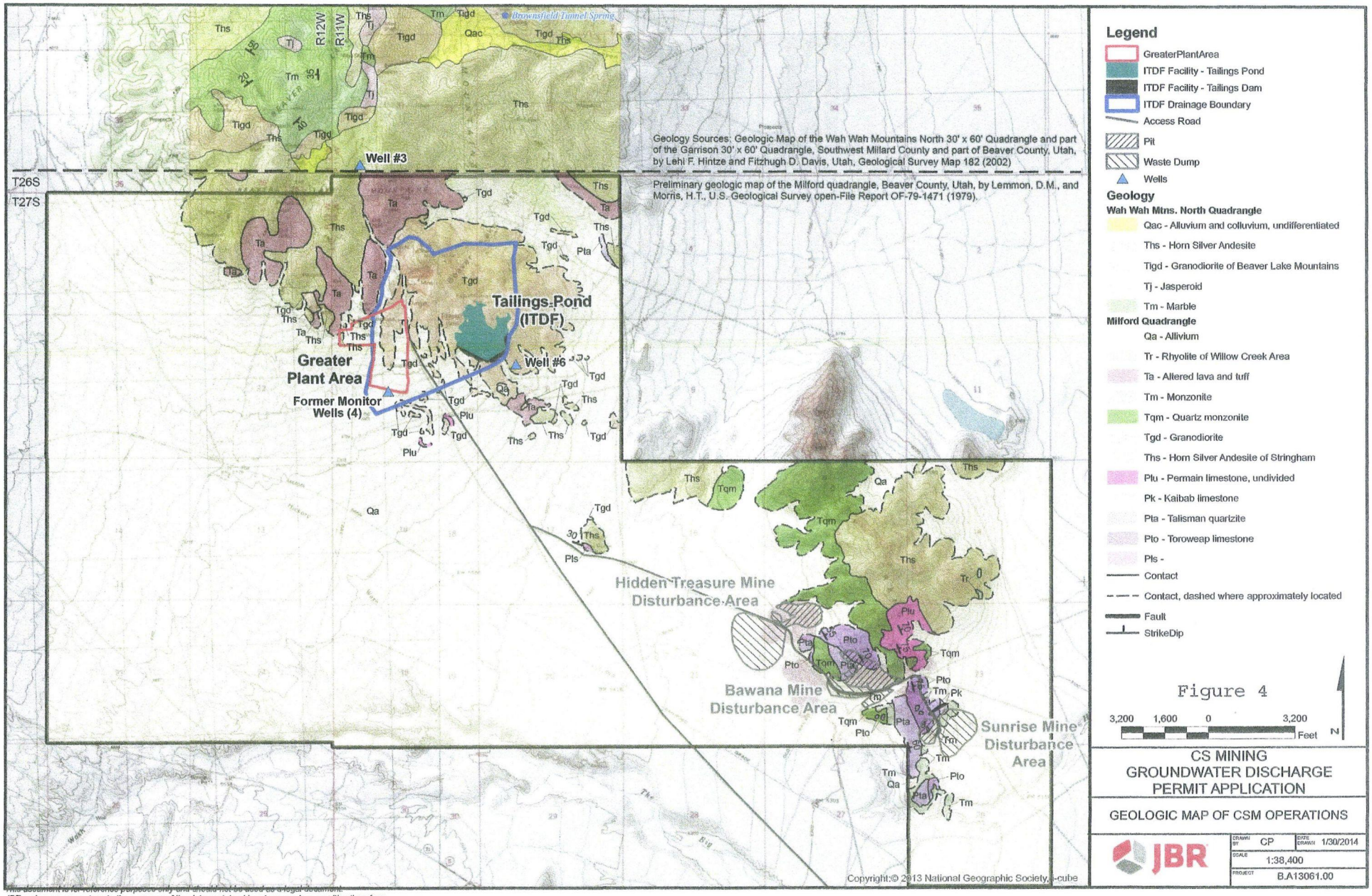


Figure 4

3,200 1,600 0 3,200 Feet

N

CS MINING
GROUNDWATER DISCHARGE
PERMIT APPLICATION

GEOLOGIC MAP OF CSM OPERATIONS

JBR

DRAWN BY	CP
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SCALE	1:38,400
PROJECT	B.A13061.00

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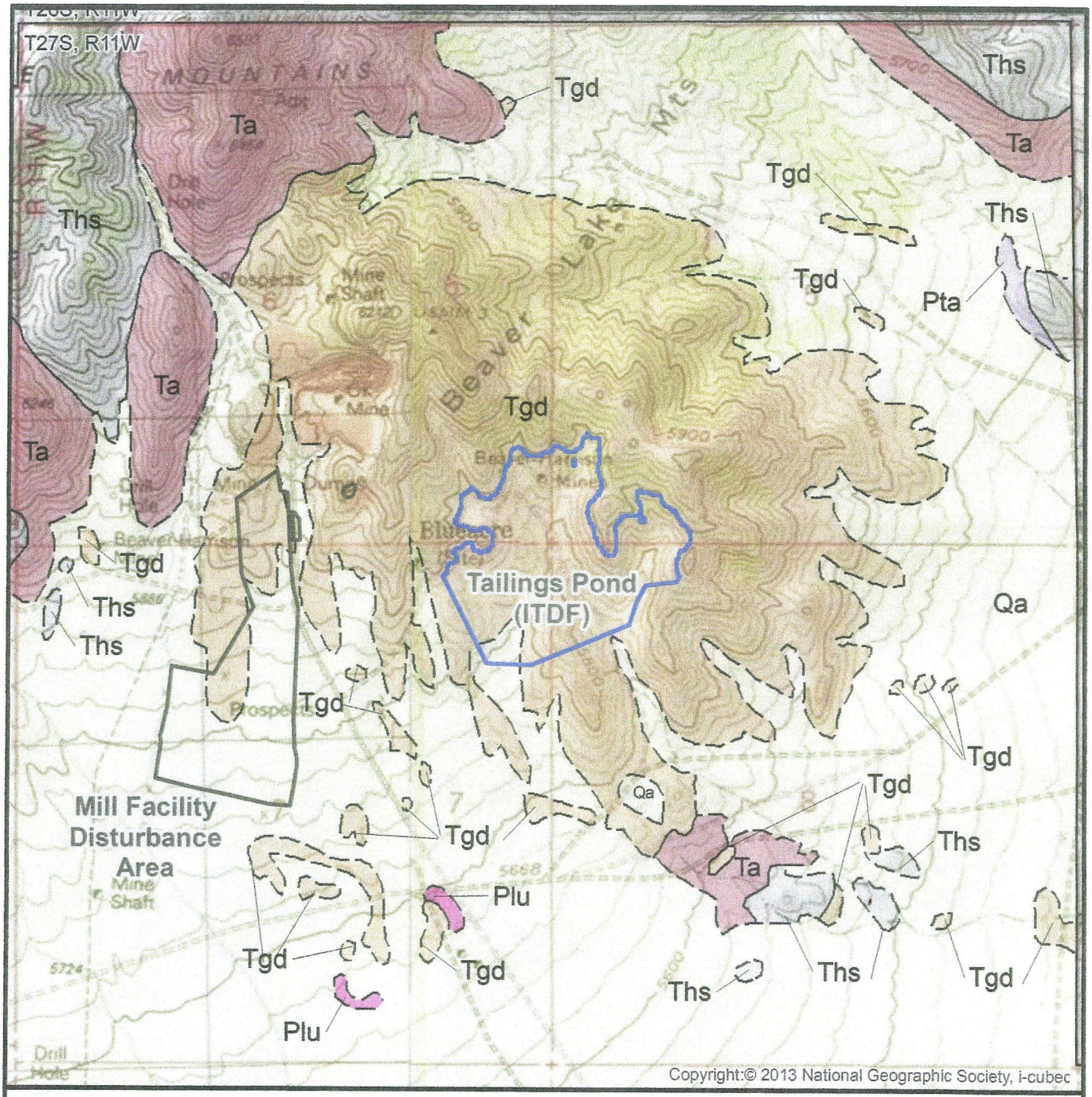

Legend

- Mill Facility Disturbance Area
- Tailings Pond
- Contact
- Contact, dashed where approximate

Geology

- Plu - Permain limestone, undivided
- Pta - Talisman quartzite
- Qa - Allivium
- Ta - Altered lava and tuff
- Tgd - Granodiorite

1,800 900 0 1,800 Feet

Geology Source: Preliminary Geologic Map of the Milford Quadrangle, Beaver County, Utah
U.S. Geological Survey Open-File Report 79-1471, 1979

N

CS MINING
GROUNDWATER DISCHARGE
PERMIT APPLICATION

GEOLOGIC MAP OF FACILITIES
AND IDTF AREA

JBR

DRAWN BY	CP	DATE DRAWN	1/22/2014
SCALE	1:18,000		
PROJECT	B.A13061.00		

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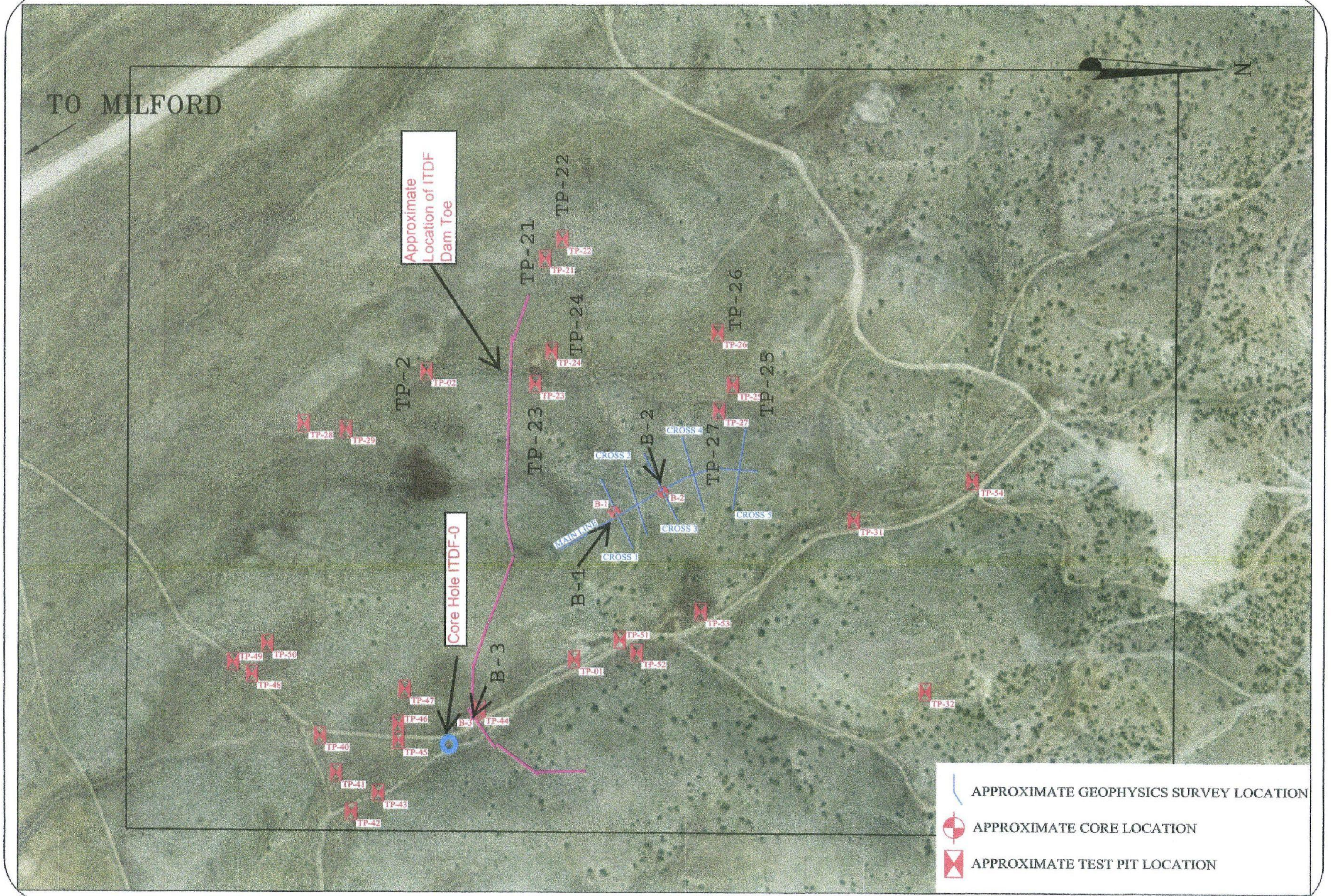
INTERIM FIGURE 5



IGES

Drawing Notes

Figure 6
ITDF Test Pit and Core Hol
Exploration Location Map

CS Mining
Plant Expansion
Beaver County
Utah

Project Number 01640-002

No.	Revision/Issue	Date

SHEET

A-2

JMG 8/8/13 I:\Projects\ CS Mining

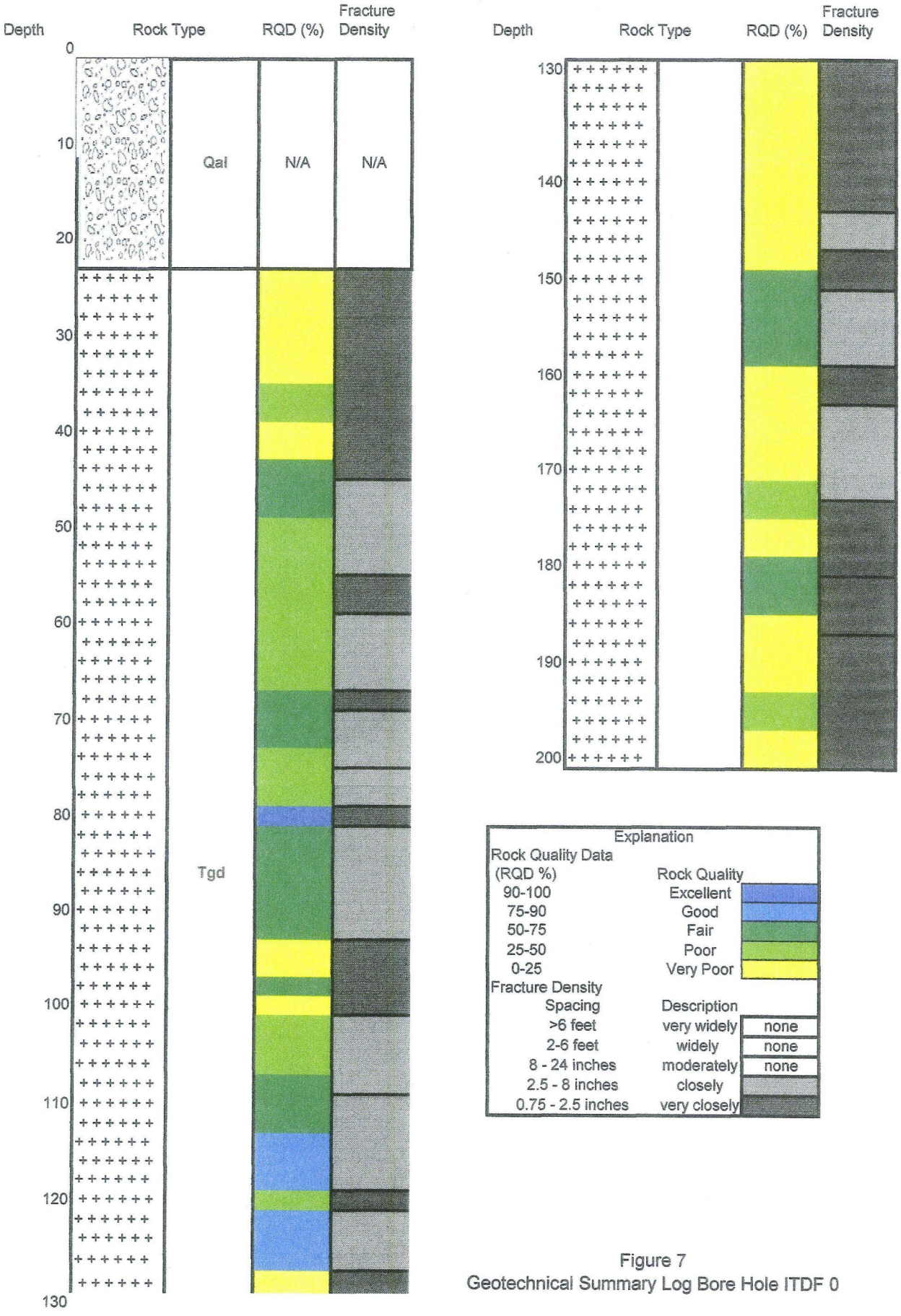
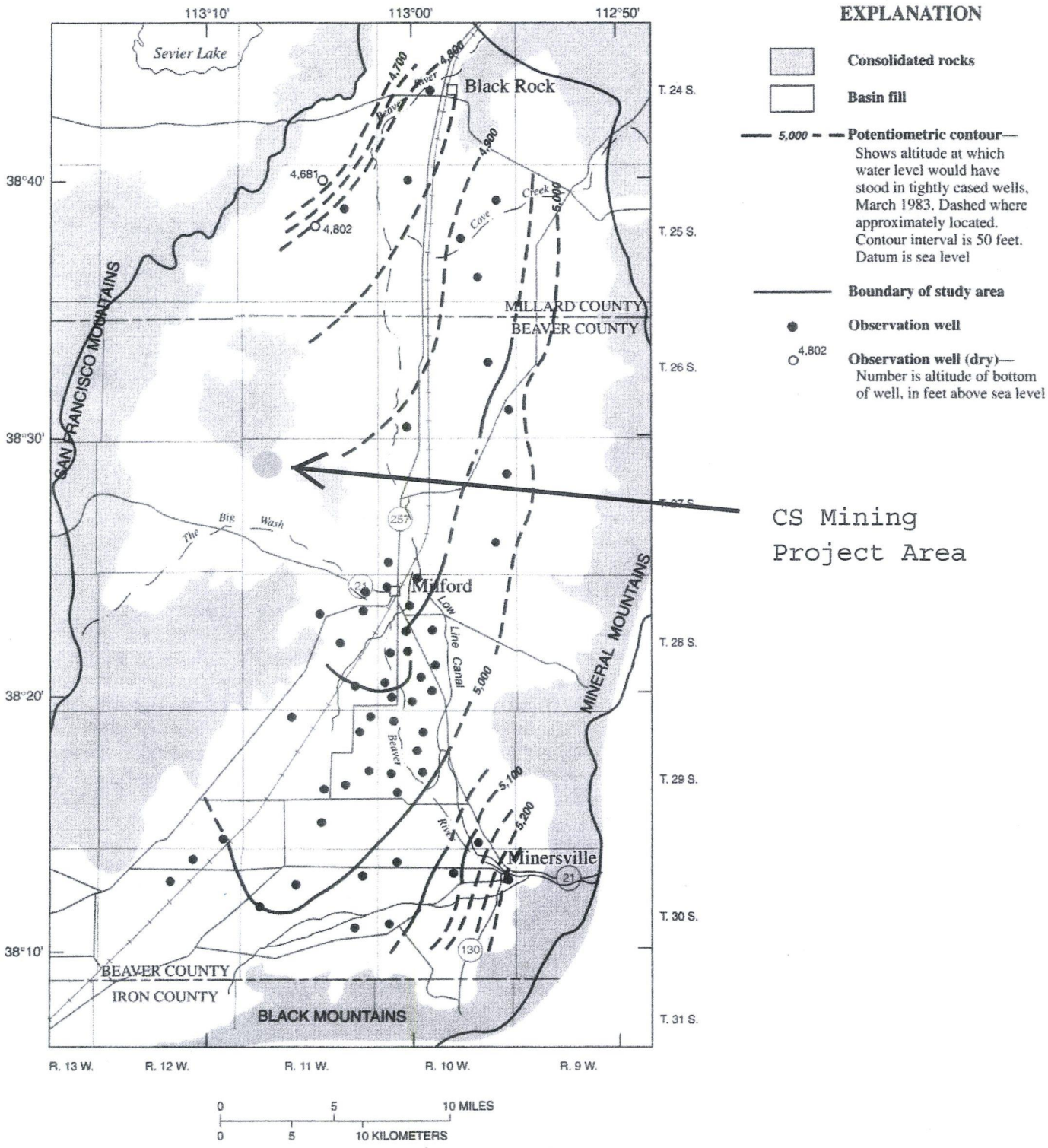


Figure 7
Geotechnical Summary Log Bore Hole ITDF 0

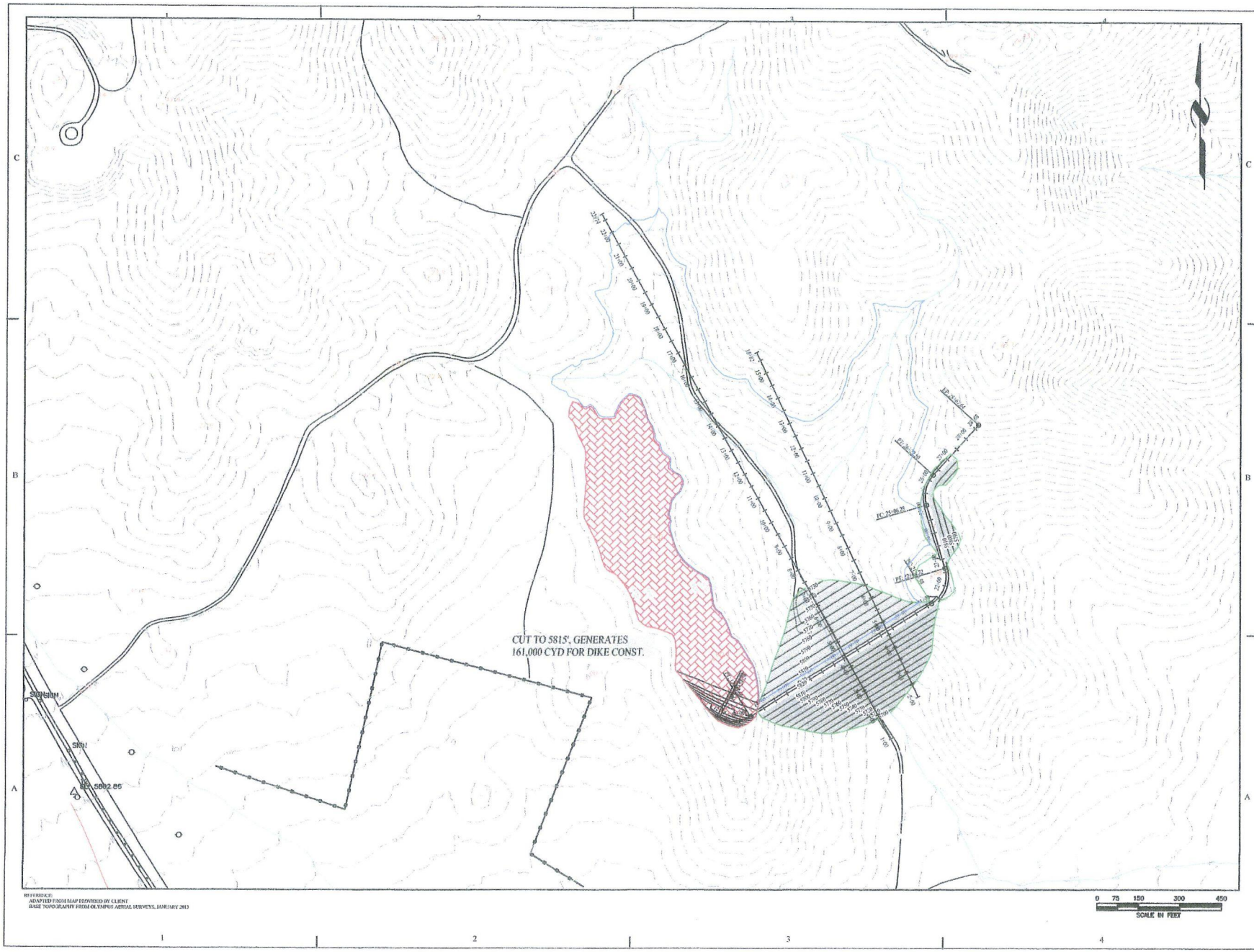


CS Mining Project Area

Figure 8

FIGURE 4.—Potentiometric surface of the principal aquifer, Milford area, 1983.

(from Mason, 1998)



REFERENCE:
ADAPTED FROM MAP PROVIDED BY CLIENT
BASE TOPOGRAPHY FROM OLYMPUS AERIAL SURVEYS, JANUARY 2013

CS Mining
P.O. Box 606
1206 South 200 West
Milford, Utah 84751

CONSULTANTS

IGES
ideas for a changing world

- BLM BOUNDARY (APPROX)
- EXISTING CONTOUR (10')
- LIMITS OF TAILINGS/WATER
- BORROW AREA (PARTIAL)

NOTES:

EAST STARTER & SADDLE
ELEV. 5820':
CUT/FILL - 403,000 CYD
WATER/TAILINGS CAPACITY:
(FILL TO 5814') -1,195,500 CYD*
LINED AREA - 1,300,000 SQ-FT

*DOES NOT INCLUDE ADDITIONAL AIRSPACE FOR BORROW OBTAINED WITHIN IMPOUNDMENT

MARK	DATE	DESCRIPTION

ISSUE:

PROJECT NO.:	01640-001
CAD DWG FILE:	01640/CS WORKING.dwg
DRAWN BY:	JAH
DESIGNED BY:	JPW
CHECKED BY:	CS
COPYRIGHT:	IGES 2013

SHEET TITLE

CS MINIMG

TAILINGS POND EAST STARTER

Figure 9
2

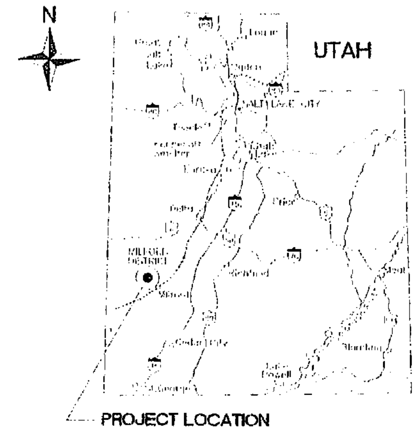
APPENDICES

Appendix A
Acid Leach and SX/EW Plant
Design Drawings

CS MINING LLC

TAILINGS LEACH/CCD PROJECT - PHASE 1
SOLVENT EXTRACTION, ELECTROWINNING

MILFORD, UTAH



INDEX OF DRAWINGS

DRAWING NUMBER	DESCRIPTION
GENERAL ARRANGEMENT	
00-GA-00	INDEX OF DRAWINGS AND SPECIFICATIONS
00-GA-01	OVERALL PLANT SITE LAYOUT
SOLVENT EXTRACTION	
30-FS-01	FLOWSHEET
30-GA-01	UNIT LAYOUT
30-GA-02	UNIT CONCRETE PLAN
ELECTROWINNING	
40-FS-01	FLOWSHEET
40-GA-01	UNIT LAYOUT
40-[illegible]-02	POLYMER CONCRETE CELL DETAILS
40-M-02	CATHODE AND ANODE DETAILS
TANK FARM	
50-GA-01	UNIT LAYOUT
LEACH CIRCUIT TANKS/CCD	
[illegible]	FLOWSHEET
[illegible]-GA-01	LEACH CIRCUIT TANKS LAYOUT
[illegible]	CCD THICKENERS [illegible] LAYOUT
[illegible]	CCD THICKENERS [illegible] SECTION
[illegible]	ACID STORAGE UNIT LAYOUT
[illegible]	[illegible] LAYOUT
PONDS	
[illegible]	[illegible] POND LAYOUT
[illegible]	SECTIONS AND DETAILS
[illegible]	SECTIONS AND DETAILS
[illegible]	SECTIONS AND DETAILS
[illegible]	SECTIONS AND DETAILS

ABBREVIATIONS

ANCHOR BOLT	AB	GRADE	GR
AT	AT	GRATING	GRTG
BASE PLATE	BP	HIGH POINT	H.P.
BEAM	BM	HIGH STRENGTH BOLT	H.S.B.
BOTTOM	BOT	HORIZONTAL	HORIZ.
BOTTOM OF BASE PLATE	B.O.B.P.	INCH	IN
BOTTOM OF PIPE	B.O.P.	INSIDE DIAMETER	I.D.
BOLT CIRCLE	BC	INSIDE RADIUS	I.R.
BUILDING	BLDG	JOINT	JT
CENTERLINE	CL	LONG	LG
CLEAR	CLR	MAXIMUM	MAX.
[illegible] CONVEYOR	[illegible] CONV	MINIMUM	MIN.
COLUMN	COL	MODIFIED	MOD.
CONCENTRIC REDUCER	CONC. RED	NEAR SIDE	NS
CONCRETE	CONC.	NOT IN CONTRACT	N.I.C.
CONTROL VALVE	CV	NOT TO SCALE	N.T.S.
CONTINUOUS	CONT	ON CENTER	O.C.
CUBIC FOOT	CU. FT	OUTSIDE DIAMETER	O.D.
DIAMETER	DIA	PLATE	PL
DIMENSION	DIM	[illegible]	[illegible]
DOWN	DN	RADIUS	RAD
DRAWING	DWG	REFERENCE	REF
EACH	EA	RELOCATED	RELOC
EACH WAY	EW	SQUARE FOOT	SQ. FT.
ELBOW	ELL	STANDARD	STD
ELEVATION	ELEV	STEEL	STL
EQUAL	EQ	STIFFENER	STIFF.
EQUIPMENT	EQUIP	TOP AND BOTTOM	T AND B
EXISTING	EX	TOP OF CONCRETE	T.O.C.
EXPANSION	EXP	TOP OF GRATING	T.O.G.
EXPANSION JOINT	EJ	TOP OF STEEL	T.O.S.
FINISH GRADE	FIN. GR.	TYPICAL	TYP.
FOOT	FT	UNLESS NOTED OTHERWISE	U.N.O.
FOOTING	FTG	VERTICAL	VERT.
FOUNDATION	FND	WEATHERPROOF	WP
GAGE	GA	WITH	W/
GALLON	GAL	WORK POINT	WP

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PROJECT NO. 2012-01
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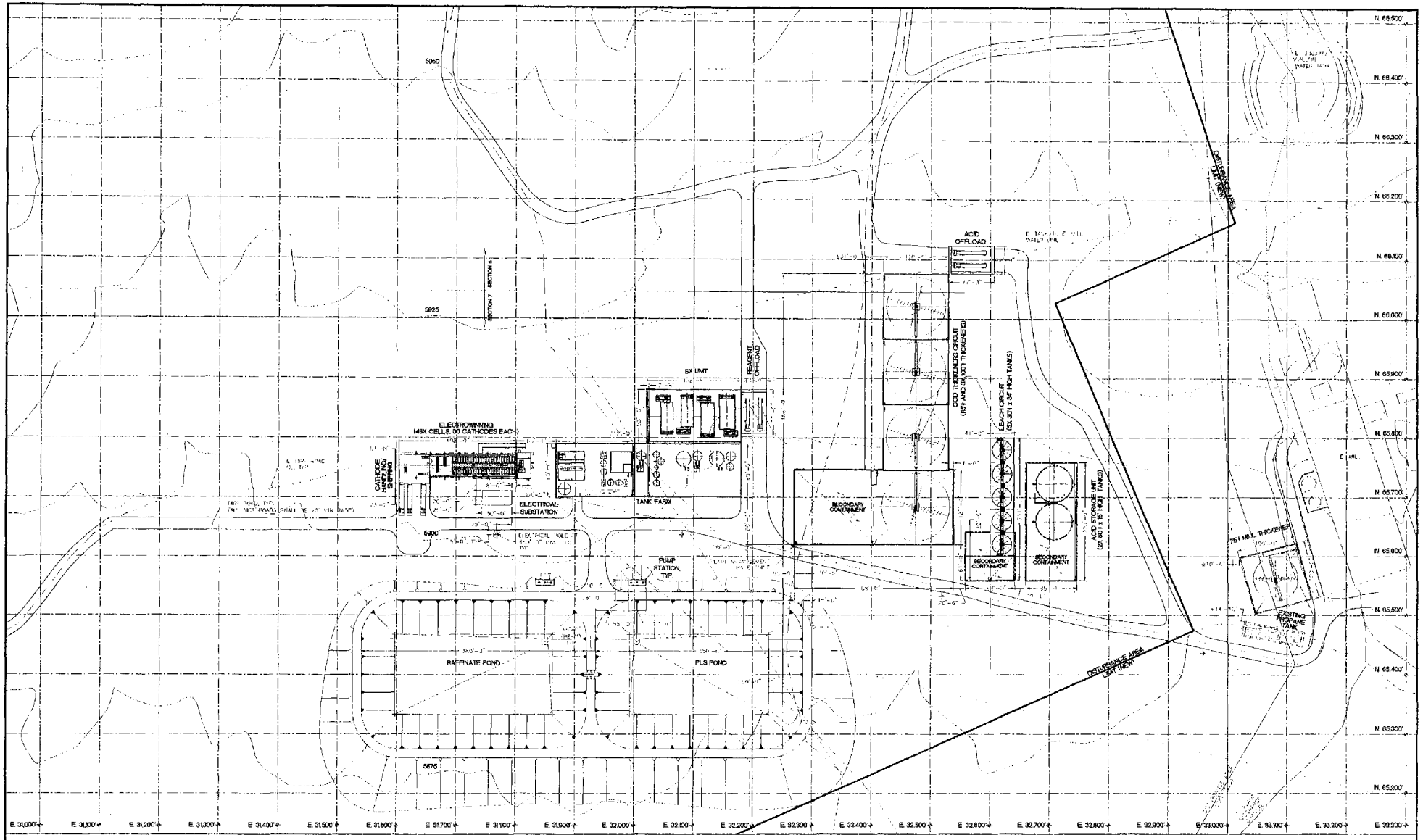
TUCSON, AZ 85711

COPPER LEACH/CCD PROJECT - PHASE 1
SOLVENT EXTRACTION, ELECTROWINNING
GENERAL ARRANGEMENT
INDEX OF DRAWINGS AND SPECIFICATIONS

00-GA-00



PROCESS PLANT SITE PLAN

SCALE: 1" = 60'-0"

45,000 TPD OPE DESIGN RATE – PHASE 1a OPTION
30,000 TPD OPE DESIGN RATE – PHASE 1b OPTION

PROJECT NORTH

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COPPER LEACH/CCD PROJECT - PHASE 1
SOLVENT EXTRACTION, ELECTROWINNING
GENERAL ARRANGEMENT
PROCESS PLANT SITE LAYOUT

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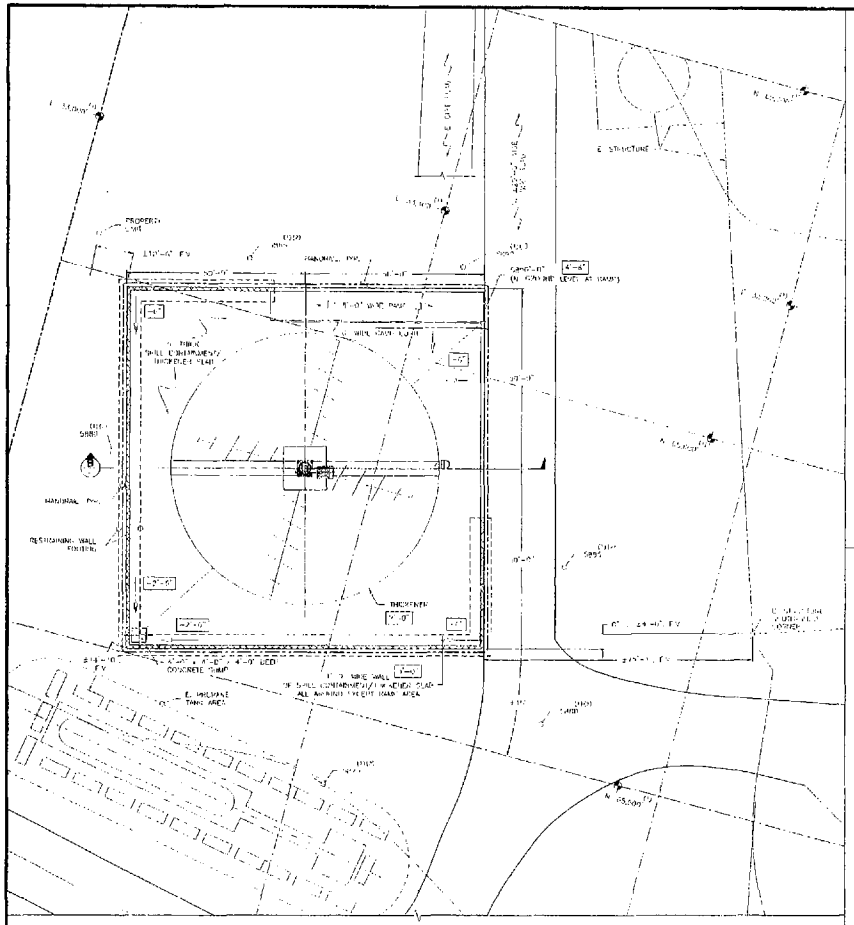
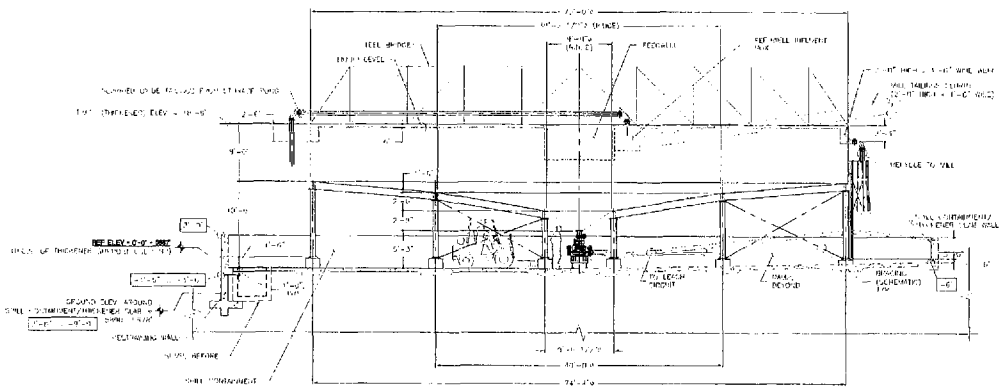
DRAWING NO. 00-GA-01

SHEET 1 OF 1

REVISION 0-1



MILL THICKENER PLAN



SECTION THROUGH THICKENER (B)

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COPPER LEACH/CCD PROJECT - PHASE 1
SOLVENT EXTRACTION, ELECTROWINNING
LEACH CIRCUIT TANKS/CCD
MILL THICKENER LAYOUT

SCALE: AS NOTED

DRAWING NO.: 63-GA-01

SHEET 1 OF 1

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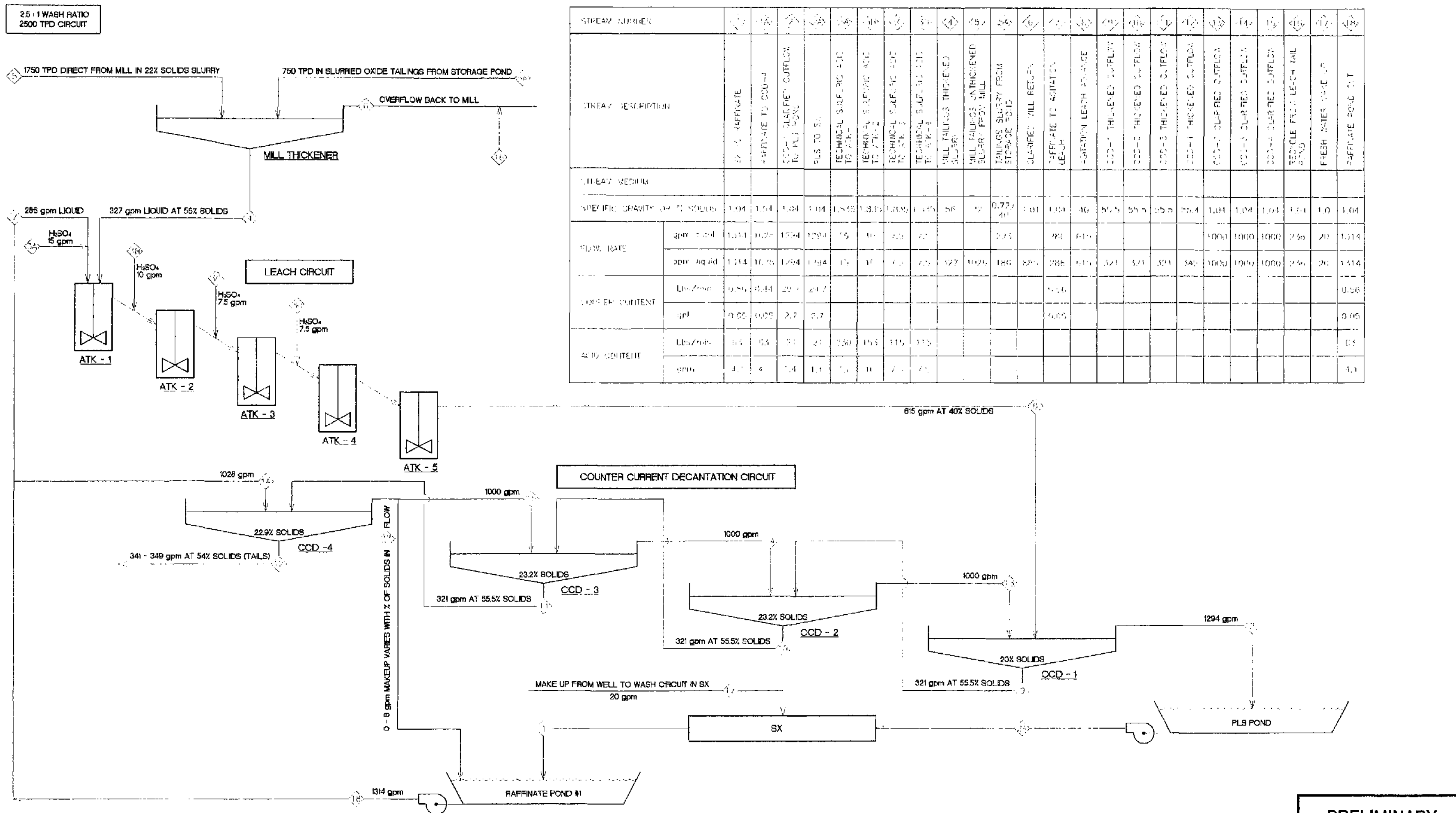

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STREAM MEDIUM																									
SPECIFIC GRAVITY OR % SOLIDS		1.04	1.04	1.04	1.04	1.835	1.835	1.835	1.835	56	[illegible]	0.77/40	1.01	1.04	40	55.5	55.5	55.5	55.4	1.04	1.04	1.04	[illegible]	1.0	1.04
FLOW RATE	gpm total	1,314	[illegible]	1294	1294	15	10	7.5	7.5			[illegible]		286	615					1000	1000	1000	[illegible]	20	1,314
	gpm liquid	1,314	[illegible]	1294	1294	15	10	7.5	7.5	327	[illegible]	186	[illegible]	286	615	321	321	321	349	1000	1000	1000	[illegible]	20	1,314
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	gpl	0.05	0.05	2.7	2.7									0.05											0.05
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COPPER LEACH/CCD PROJECT - PHASE 1
SOLVENT EXTRACTION, ELECTROWINNING
LEACH CIRCUIT TANKS/CCD
FLOWSHEET

PROJECT NO 2012-01

WESTERN STATES ENGINEERING
5210 E. Williams Circle, Suite 700
TUCSON AZ 85711

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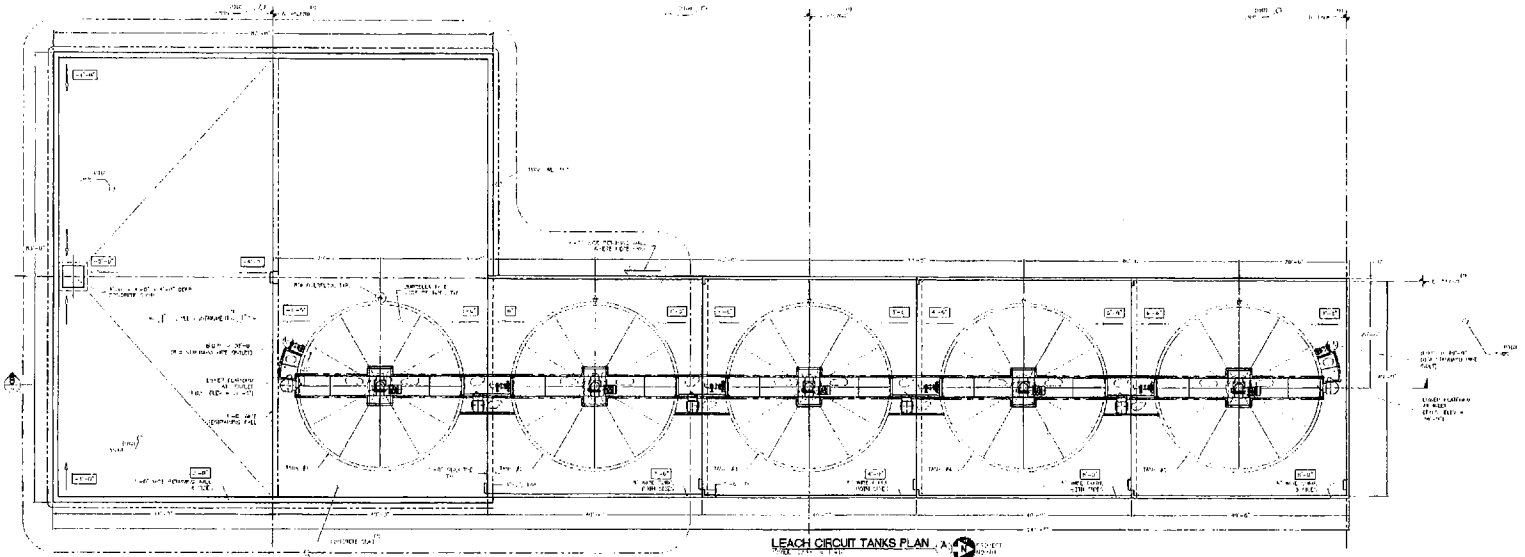
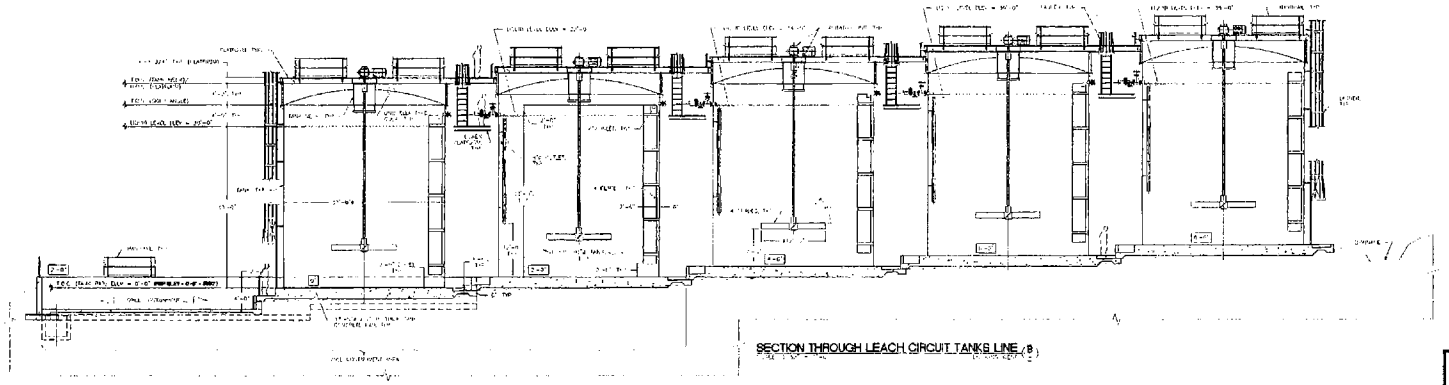


LEACH CIRCUIT TANKS PLAN



SECTION THROUGH LEACH CIRCUIT TANKS LINE B

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TUCSON, AZ 85711

COPPER LEACH/CCD PROJECT - PHASE 1
SOLVENT EXTRACTION, ELECTROWINNING
LEACH CIRCUIT TANKS/CCD
LEACH CIRCUIT TANKS LAYOUT

DRAWING NO. 60-GA-01

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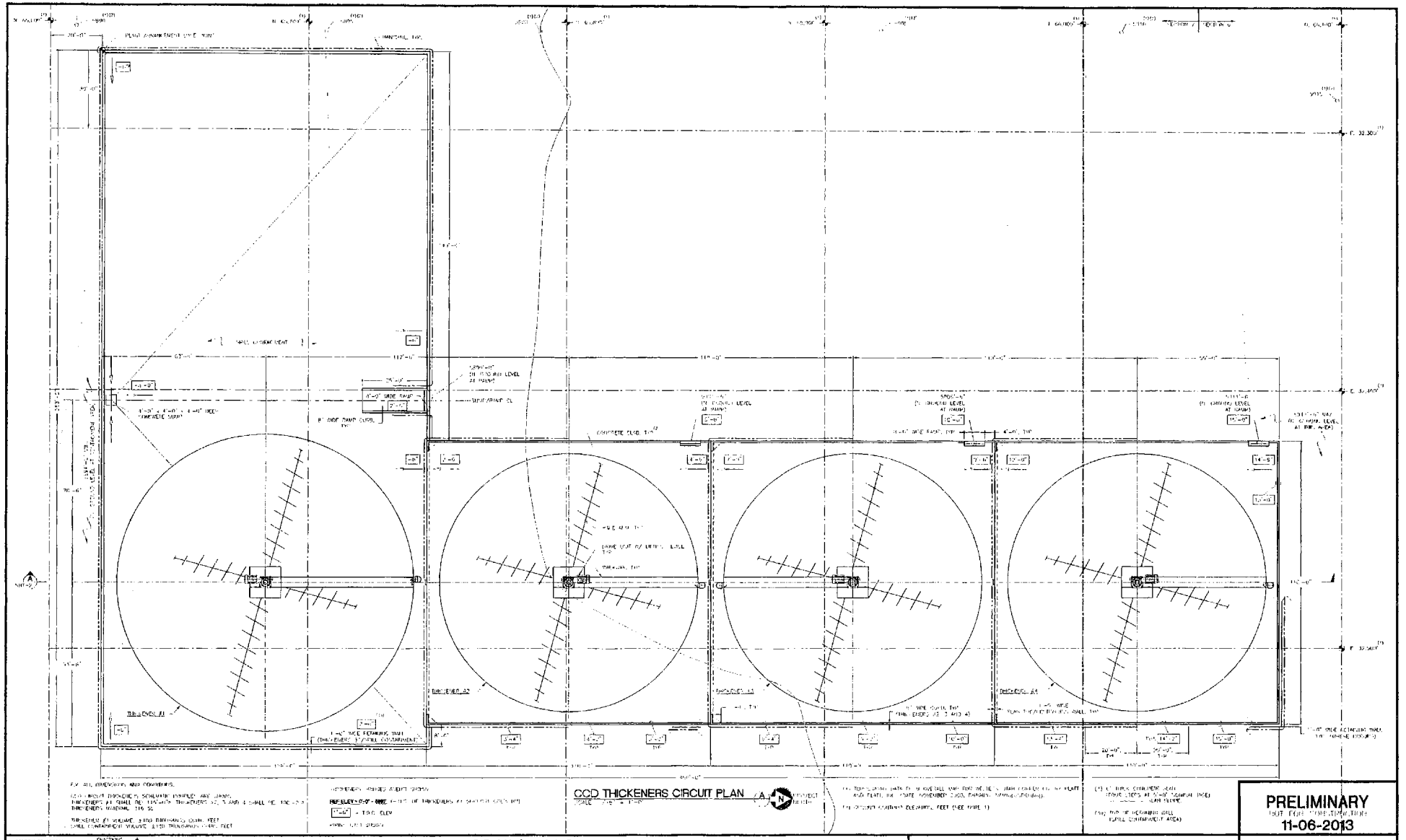
REVISION 01



CCD THICKENERS CIRCUIT PLAN

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CS Mining LLC

PROJECT NO 2012-01

WESTERN STATES ENGINEERING
5210 E. Williams Circle, Suite 700
TUCSON, AZ 85711
PHONE 520-298-2010 FAX 520-889-2715

COPPER LEACH/CCD PROJECT - PHASE 1
SOLVENT EXTRACTION, ELECTROWINNING
LEACH CIRCUIT TANKS/CCD
CCD THICKENERS CIRCUIT LAYOUT

DRAWING NO. 61-GA-01

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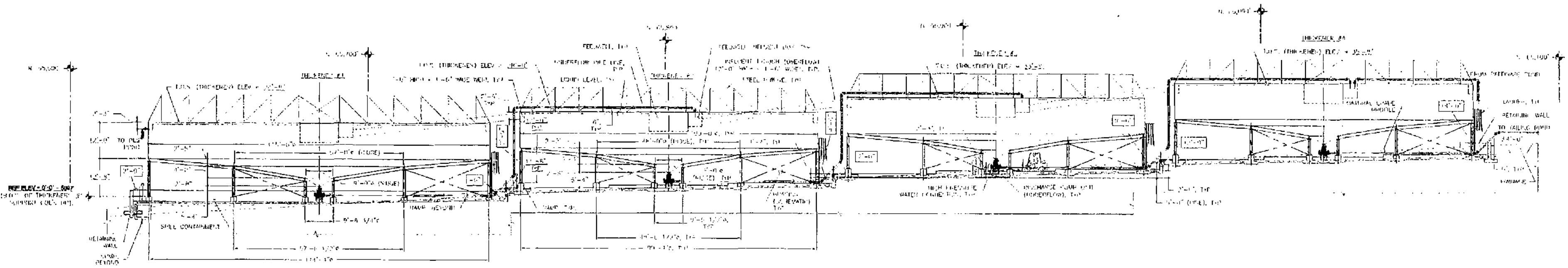

SECTION THROUGH CCD THICKENERS CIRCUIT EAST LINE (A)

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11-06-2013

CS Mining LLC

PROJECT NO 2012-01

WESTERN STATES ENGINEERING
5210 E. Williams Circle, Suite 700
TUCSON AZ 85711

COPPER LEACH/CCD PROJECT - PHASE 1
SOLVENT EXTRACTION, ELECTROWINNING
LEACH CIRCUIT TANKS/CCD
CCD THICKENERS CIRCUIT SECTION

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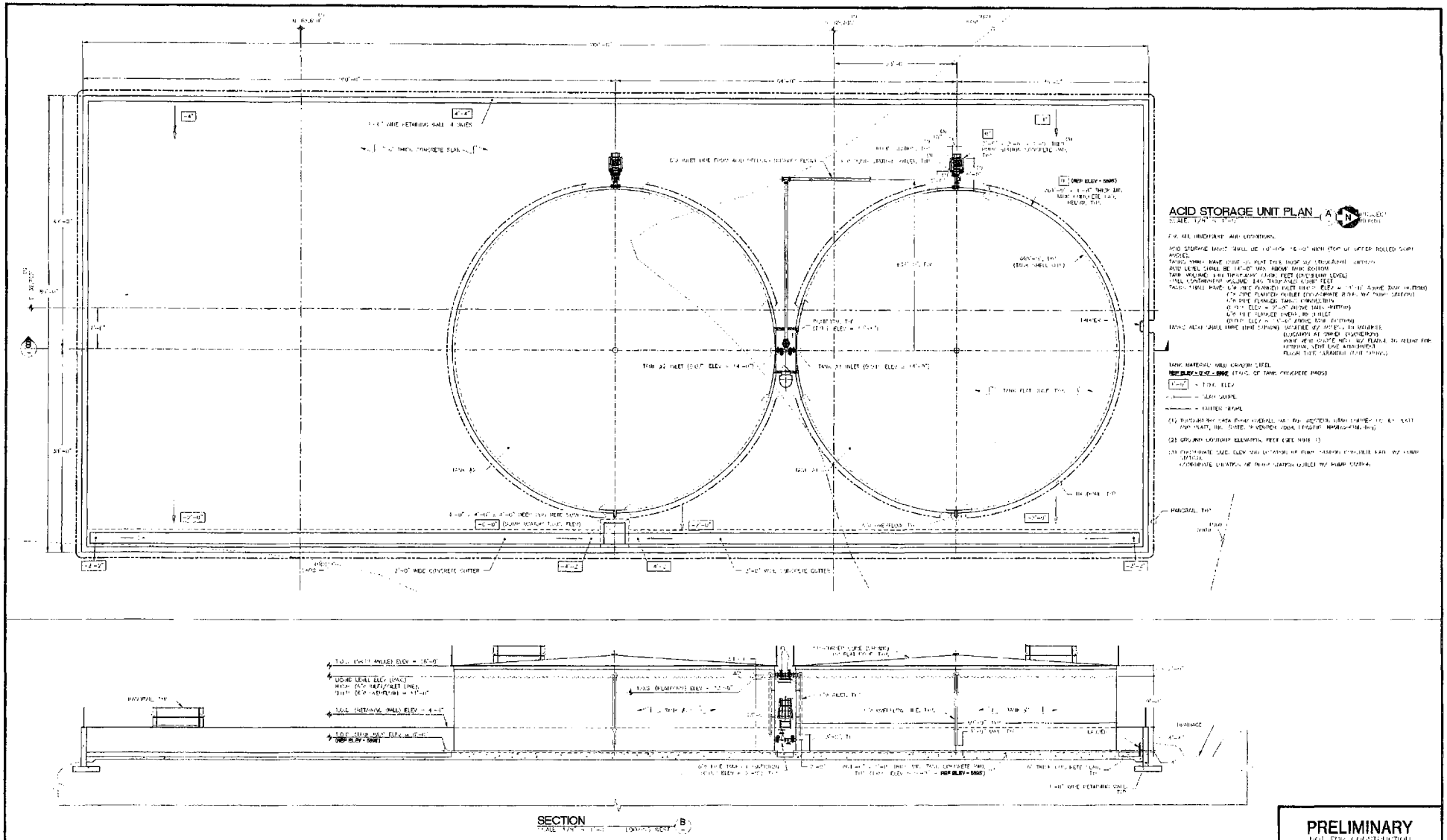

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11-06-2013

CS Mining LLC

COPPER LEACH/CCD PROJECT - PHASE 1
SOLVENT EXTRACTION, ELECTROWINNING
LEACH CIRCUIT TANKS/CCD
ACID STORAGE UNIT LAYOUT

DRAWING NO. 62-GA-01

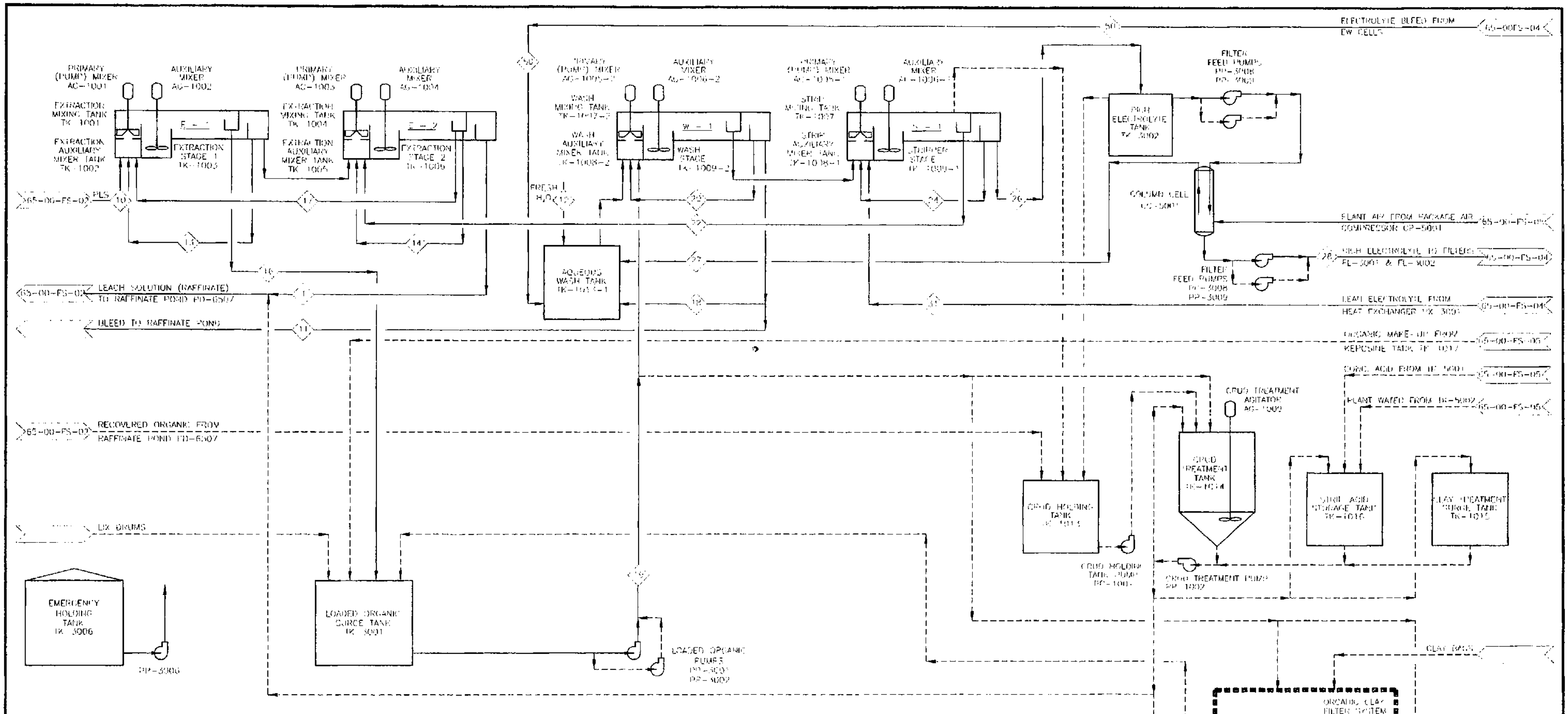
SHEET 1 OF 1

REVISION 1

SCALE AS NOTED

PROJECT NO. 2012-01

WESTERN STATES ENGINEERING
5210 E. Williams Circle, Suite 700
TUCSON, AZ 85711
PHONE 520-889-2510 FAX 520-889-2532



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STREAM DESCRIPTION		RAFFINATE	PLS	WASH STAGE BLEED	FRESH WATER TO AQUEOUS WASH TANK	E-1 RECYCLE	E-2 RECYCLE		LOADED ORGANIC FROM E-1	LOADED ORGANIC FROM E-2	AQUEOUS TO AQUEOUS WASH TANK	LOADED ORGANIC TO STRIP	WASH STAGE RECYCLE		STRIPPED ORGANIC		RICH ELECTROLYTE RECYCLE		RICH ELECTROLYTE	FLOTATION	RICH ELECTROLYTE TO FILTERS			LEAN ELECTROLYTE					LEAN ELECTROLYTE BLEED
STREAM MEDIUM		A	A	A	A	A	O		O	O	A	O	A		O		A		A	O/A	A			A					A
SPECIFIC GRAVITY		1.03	1.03	1.04	1.0												1.2		1.[illegible]		1.2			1.[illegible]					1.2
FLOW RATE	U.S. GPM	1294	1294	20	18	427	255		1294	1294	140	1294	1154		1294		923		370	1	371			370					1.8
COPPER CONTENT	LBS/MIN	0.55	31.3	0.15					52.1	20.4		52.1			23.[illegible]				131	0.4	131			102					
	GPL	0.05	2.8	0.9					4.74	2.10		4.74			2.10		45		45	45	45			35					35
ACID CONTENT	LBS/MIN	38.5	5.1	2.5																									
	GPL	3.5	0.49	15															150		180			180					180
DESIGN TEMPERATURE	°F																				65			60					

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11-06-2013

TOLERANCE UNLESS OTHERWISE SPECIFIED: FRACTIONS ±, 0.00 ±, 0.000 ±

CS Mining LLC

REVISIONS

REV	DESCRIPTION	BY	DATE
P1	FIRST REVIEW	HM	

PROJECT NO. 2012-01

WESTERN STATES ENGINEERING
5210 E. Williams Circle, Suite 700
TUCSON, AZ 85711
PHONE: 520-[illegible] FAX: 520-[illegible]

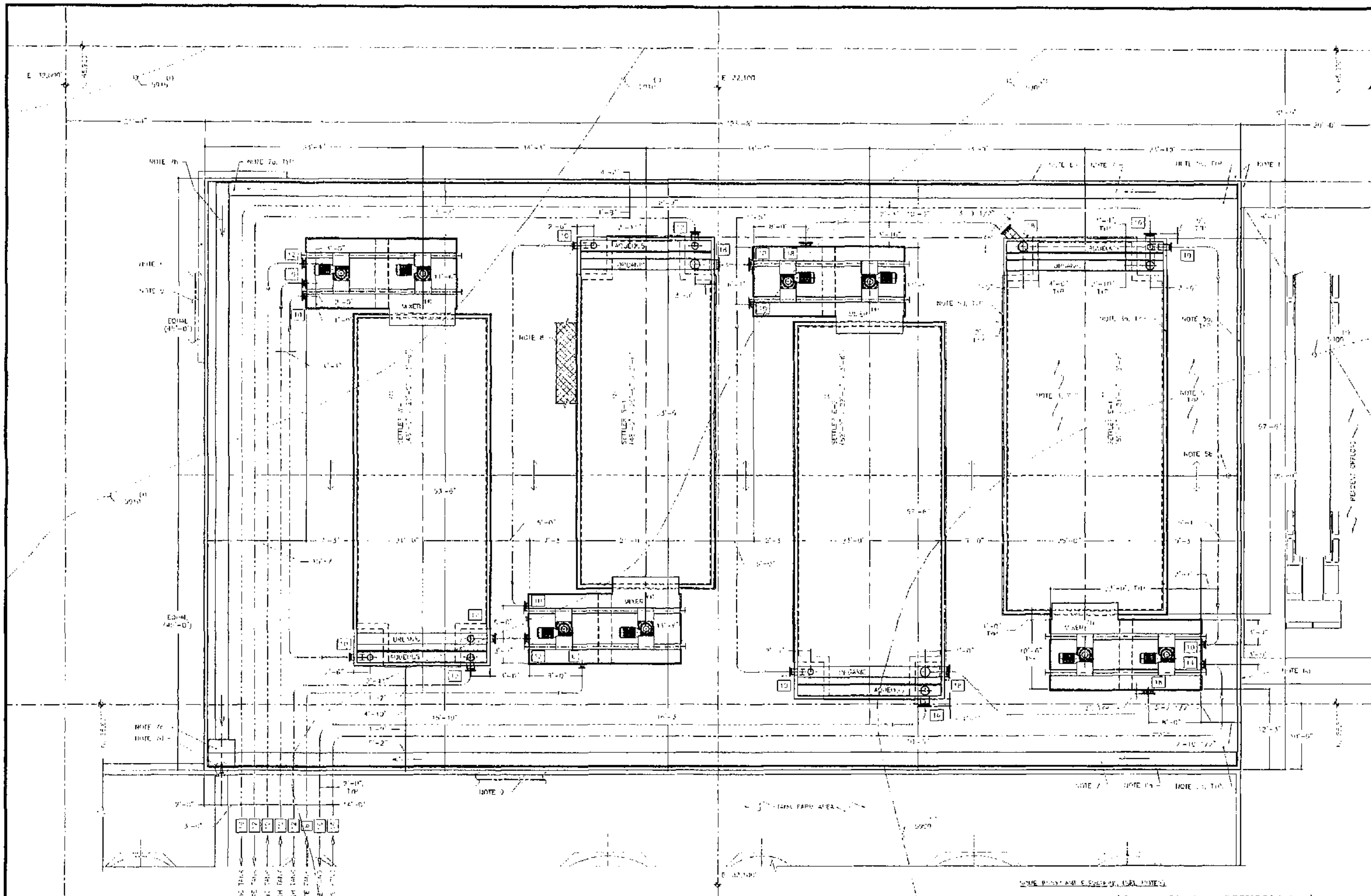
APPROVED FOR CONSTRUCTION: SAFETY, ENVIRONMENTAL, MAINTENANCE, OPERATIONS, QLTY. CONTROL; PROCESS ENGR., PROJECT ENGR., LEAD. ENGR., PLANT SUPER.

DRAWN BY: [illegible] — DATE: 11/06/13
PROJ. ENGR.: HM
ENGR. MGR.:

COPPER LEACH/CCD PROJECT - PHASE 1
SOLVENT EXTRACTION, ELECTROWINNING
SOLVENT EXTRACTION FLOWSHEET

SCALE: AS NOTED

DRAWING NO.: 30-FS-01
SHEET 1 OF 1
REVISION: P1



SOLVENT EXTRACTION UNIT PLAN

NOTES:

(1) [illegible] CONTOUR ELEVATION, FEET

(2) ALL SETTLERS ARE CONCRETE CONSTRUCTION W/SS [illegible]. ALL SETTLER SHALL HAVE [illegible] COVERS [illegible] PART OF THIS REVISION

(3) TOP OF ALL SETTLERS [illegible] CONCRETE BOTTOM = 0'-0" (REF ELEV) [illegible]

(4) ALL SETTLERS WALLS T.O.C. = [illegible]

(5) SEE MIXERS SCHEDULE FOR MIXER INFORMATION. [illegible] FOR E. MIXERS INFORMATION. TOP OF ALL MIXERS BOXES ELEV = [illegible]. BOTTOM OF ALL MIXERS BOXES ELEV = [illegible]

(5) [illegible] THICK [illegible] CONCRETE SLAB. — SLAB SLOPE

(5a) [illegible] WIDE CURB, T.O.C. ELEV = [illegible]

(5b) T.O.C. HIGH ELEV OF SLAB (EAST-WEST RIDGE) = [illegible]

(5c) T.O.C. LOW ELEV OF SLAB (EAST-WEST) = [illegible]

(5d) 10" WIDE CONCRETE WALL (SETTLER SUPPORT) T.O.C. ELEV = [illegible]

(6) [illegible] WIDE RETAINING WALL (WHERE NECESSARY)

(6a) [illegible] WALL BELOW (WHERE NECESSARY)

(7) [illegible] WIDE EAST-WEST CONCRETE GUTTER (NORTH SIDE AND SOUTH SIDE)

(7a) T.O.C. LOW ELEV OF EAST-WEST GUTTER = [illegible]

— EAST-WEST AND NORTH SOUTH (NOTE 7b) GUTTERS SLOPE

(7b) [illegible] WIDE NORTH SOUTH GUTTER (T.O.C. LOW ELEV OF GUTTER = [illegible] — SOUTH END)

(7c) [illegible] SUMP, SUMP BOTTOM T.O.S. ELEV = [illegible]

(7d) [illegible] SCHEDULE [illegible] STAINLESS STEEL PIPE WITH FLANGE AND [illegible] FLANGE, PLACED THROUGH SUMP CONCRETE WALL [illegible] ELEV = [illegible]

(8) WALKWAY (STEEL SUPPORT [illegible] ELEV [illegible]) WALKWAY DESIGN (STEEL SUPPORT, GRATING, HANDRAIL, LADDER) [illegible] PART OF THIS REVISION

(9) HANDRAIL, WHERE NECESSARY

SETTLERS C.O.F. ELEV SCHEDULE:

SETTLER / FLANGE	[illegible]	[illegible]	[illegible]	18"Ø
C.O.F OF E-1	[illegible]		[illegible]	[illegible]
C.O.F OF E-2	-2'-0"		[illegible]	[illegible]
C.O.F OF S-1	[illegible]	[illegible]		[illegible]
C.O.F OF W-1	[illegible]	[illegible] (1)		[illegible]

(1) [illegible] C.O.F. (CONNECTION W/ MIXER) = [illegible]

MIXERS SCHEDULE:

SETTLER	EXISTING MIXER	MODIFICATION	NEW MIXER
E-1 EAST	M-105	ALL FLANGES SHALL BE AS SHOWN ON PLAN	
E-2 EAST	M-105		
[illegible] EAST	M-103 OR M-104		
W-1 EAST			[illegible] M-105

PRELIMINARY
NOT FOR CONSTRUCTION
11-06-2013

CS Mining LLC

PROJECT NO 2012-01

WESTERN STATES ENGINEERING
5210 E. Williams Circle, Suite 700
TUCSON, AZ 85711
PHONE 520-[illegible] FAX [illegible]

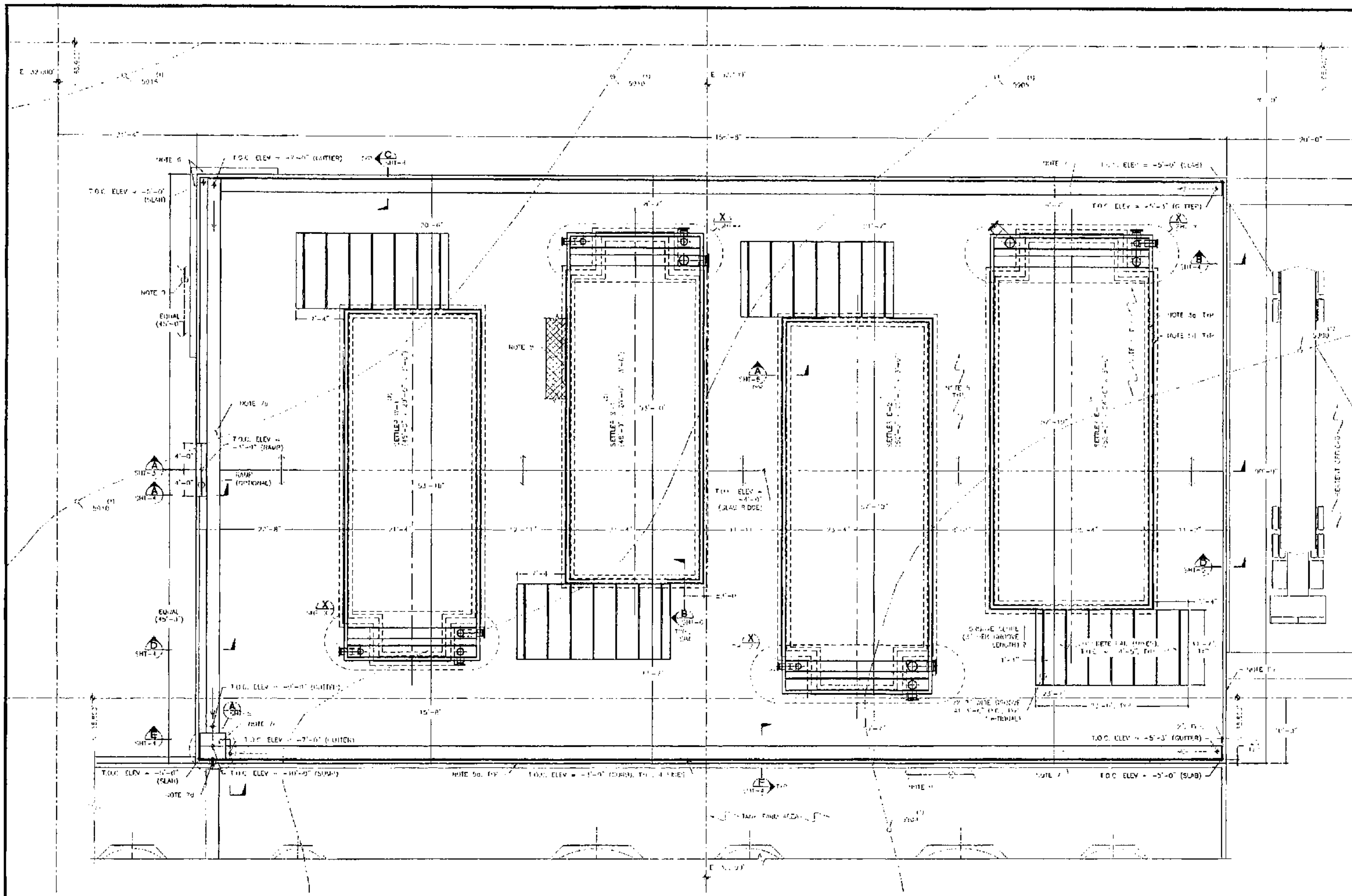
REV	DESCRIPTION	BY	DATE
P1	FIRST REVIEW	[illegible]	[illegible]

COPPER LEACH/CCD PROJECT - PHASE 1
SOLVENT EXTRACTION, ELECTROWINNING
SOLVENT EXTRACTION
UNIT LAYOUT

SCALE: AS NOTED

DRAWING NO. 30-GA-01

REVISION P1



CONCRETE PLAN

NOTES:

(1) GROUND CONTOUR ELEVATION, FEET

(4) NOT USED

(7a) NOT USED

(9) HANDRAIL, WHERE NECESSARY

SOME IMPORTANT ELEVATIONS (SEE NOTES):

PRELIMINARY

NOT FOR CONSTRUCTION

11-06-2013

TOLERANCE UNLESS OTHERWISE SPECIFIED	FRACTIONS ± / 0.00 ± / 0.000 ±

CS Mining LLC

REV	DESCRIPTION	BY	DATE
P1	FIRST REVIEW		

PROJECT NO 2012-01

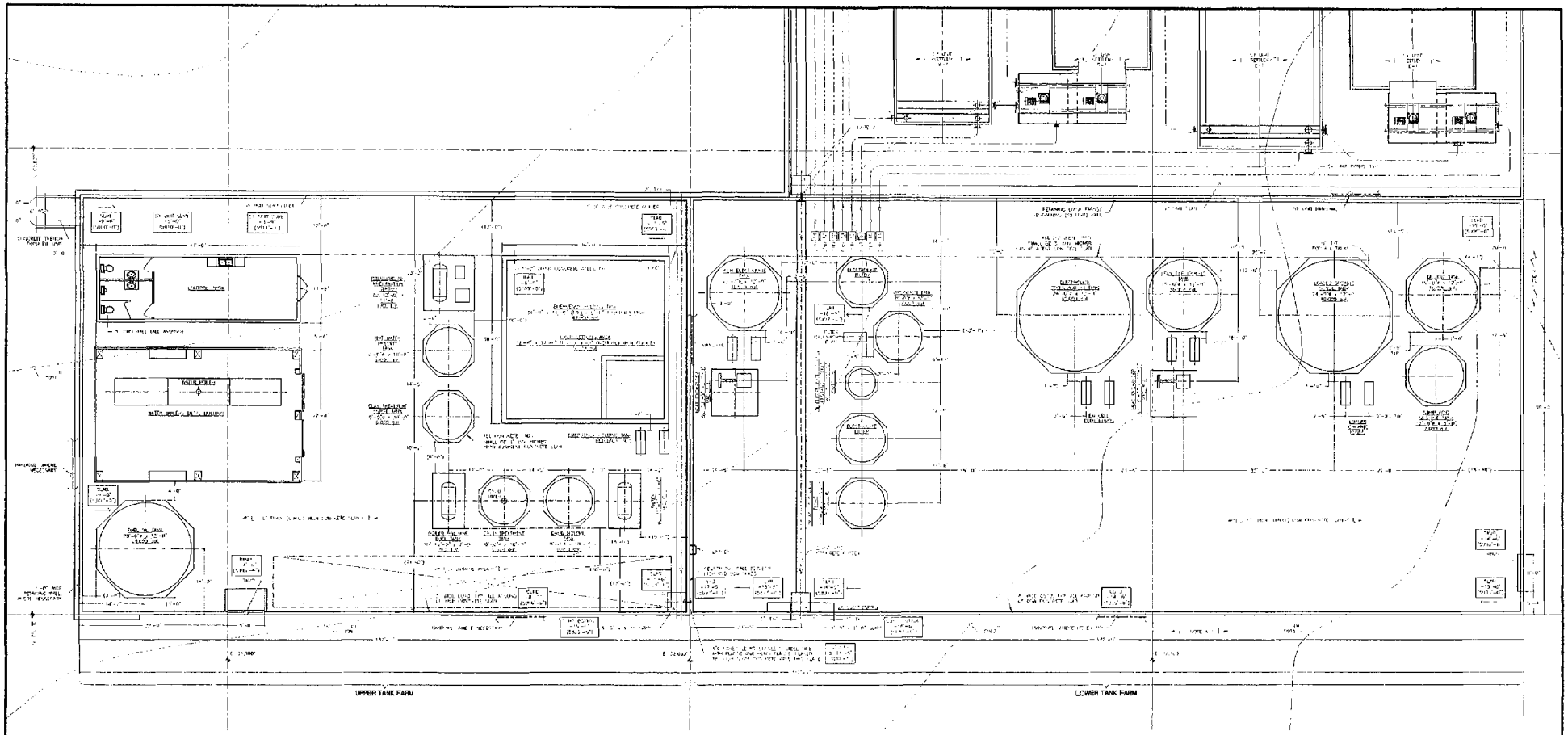
WESTERN STATES ENGINEERING
5210 E. Williams Circle, Suite 700
TUCSON, AZ 85711

COPPER LEACH/CCD PROJECT - PHASE 1
SOLVENT EXTRACTION, ELECTROWINNING

SOLVENT EXTRACTION
UNIT CONCRETE PLAN

SCALE: AS NOTED

DRAWING NO: 30-GA-02



TANK FARM PLAN

PRELIMINARY
NOT FOR CONSTRUCTION
11-06-2013

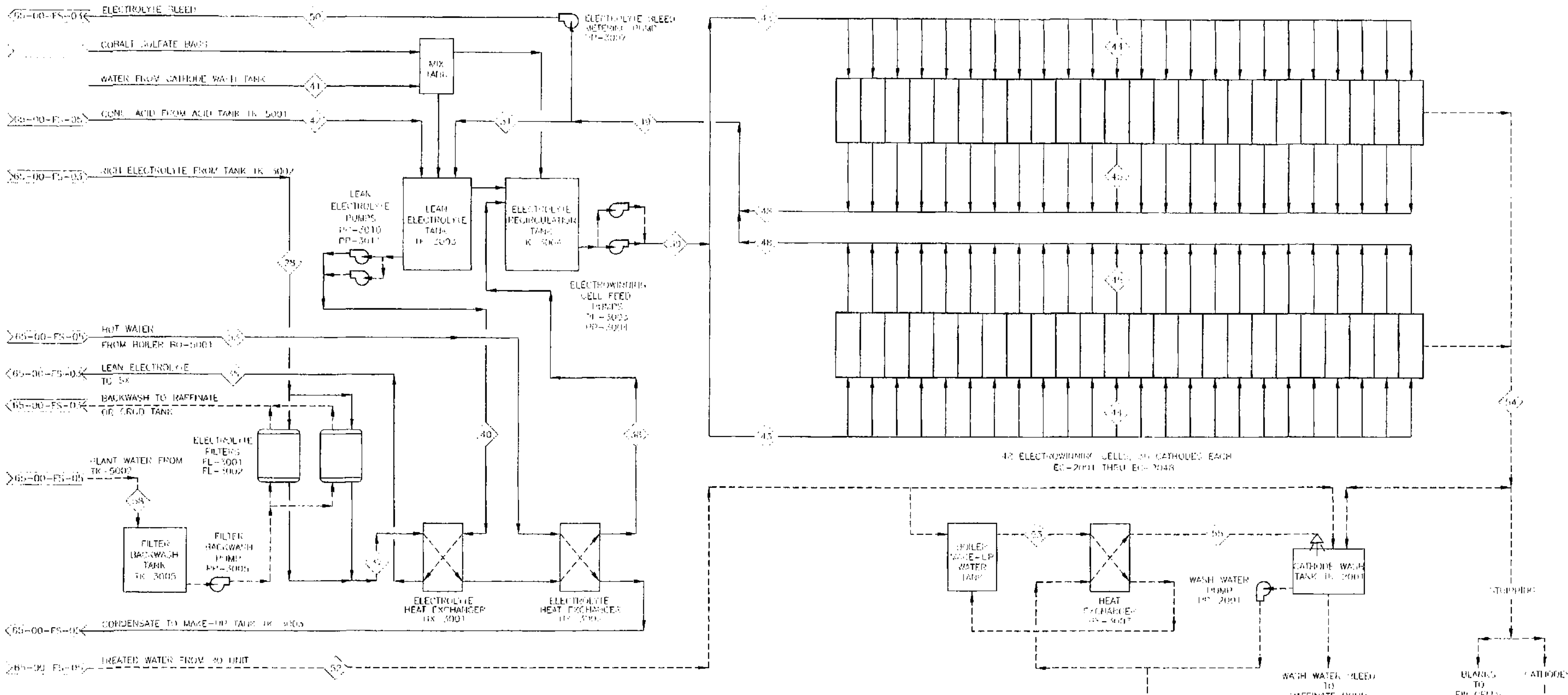
CS Mining LLC

COPPER LEACH/CCD PROJECT - PHASE 1
SOLVENT EXTRACTION, ELECTROWINNING
TANK FARM
UNIT LAYOUT

WESTERN STATES ENGINEERING
5210 E. Williams Circle, Suite 700
TUCSON, AZ 85711
PROJECT NO. 2012-01

DRAWING NO. 50-GA-01
SHEET 1 OF 1
REVISION 1

SCALE: AS LISTED



STREAM NUMBER		34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55
STREAM DESCRIPTION		RICH ELECTROLYTE TO FILTERS	LEAN ELECTROLYTE TO SX (TOTAL)		RICH ELECTROLYTE TO HEAT EXCHANGER	RICH ELECTROLYTE TO EW	STRONG ELECTROLYTE TO EW	LEAN ELECTROLYTE TO HEAT EXCHANGER	MAKE-UP WATER	CONC. SULFURIC ACID	STRONG ELECTROLYTE TO EW PER SECTION	STRONG ELECTROLYTE TO EW PER CELL	WEAK ELECTROLYTE FROM EW PER CELL	PROCESS WATER		WEAK ELECTROLYTE FROM EW PER SECTION	WEAK ELECTROLYTE TOTAL	WEAK ELECTROLYTE BLEED	WEAK ELECTROLYTE TO RECIRCULATION	TREATED WATER	BOILER [illegible] WATER	CATHODE COPPER	WASH WATER
STREAM MEDIUM																							
SPECIFIC GRAVITY		1.2	1.2		1.2	1.2	1.2	1.2	1.0	1.84	1.2	1.2	1.2			1.2	1.2	1.2	1.2				
FLOW RATE	U.S. GPM	370	370		370	370	1262	370	2.0	0.2	641	[illegible]	[illegible]			641	[illegible]	2	1380	1	141		[illegible]
COPPER CONTENT	LBS/MIN	141.5	110.0		141.5	141.5	[illegible]	110	0.0	0.0		9.30	8.56					[illegible]				[illegible]	
	GPL	45	35		45	45	38	35	0.0	0.0	38	38	35			[illegible]	[illegible]	35	35				
ACID CONTENT	LBS/MIN								0.0	[illegible]		[illegible]	46.3					[illegible]					
	GPL	180	189		180	180	180	189	0.0			185	[illegible]				189	183	189				
DESIGN TEMPERATURE	°F	60	60		60	100	100	100				105	105				105		105	60	240		175

TOLERANCE UNLESS OTHERWISE SPECIFIED: FRACTIONS ±, 0.00 ±, 0.000 ±

REV	DESCRIPTION	BY	DATE
P1	FIRST REVIEW	HM	[illegible]

CS Mining LLC

PROJECT NO 2012-01

WESTERN STATES ENGINEERING
5210 E. Williams Circle, Suite 700
TUCSON, AZ 85711

APPROVED FOR CONSTRUCTION

DESIGN — DRAWN BY: AM — CHKD: HM

PRELIMINARY
NOT FOR CONSTRUCTION
11-06-2013

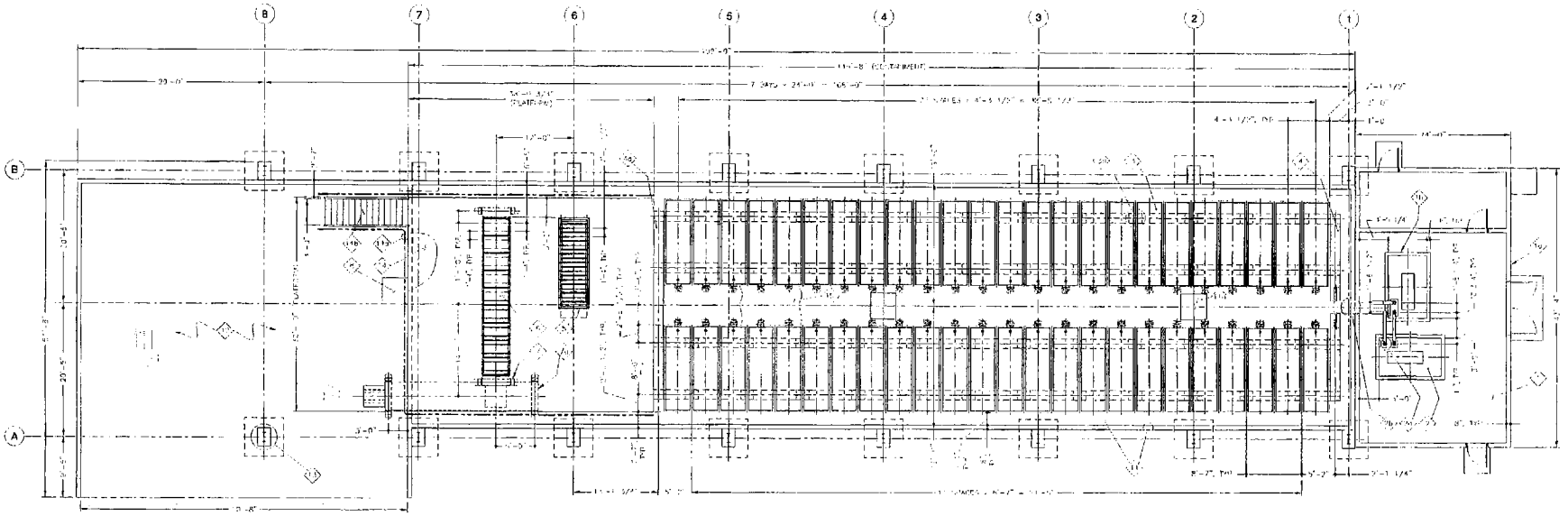
COPPER LEACH/CCD PROJECT - PHASE 1
SOLVENT EXTRACTION, ELECTROWINNING

ELECTROWINNING FLOWSHEET

SCALE: AS NOTED

DRAWING NO. 40-FS-01

REVISION P1



EW UNIT PLAN

SCALE: 1/4" = 1'-0"

PRELIMINARY
NOT FOR CONSTRUCTION
11-06-2013

CS Mining LLC

COPPER LEACH/CCD PROJECT - PHASE 1
SOLVENT EXTRACTION, ELECTROWINNING
ELECTROWINNING
UNIT LAYOUT

DRAWING NO: 40-GA-01

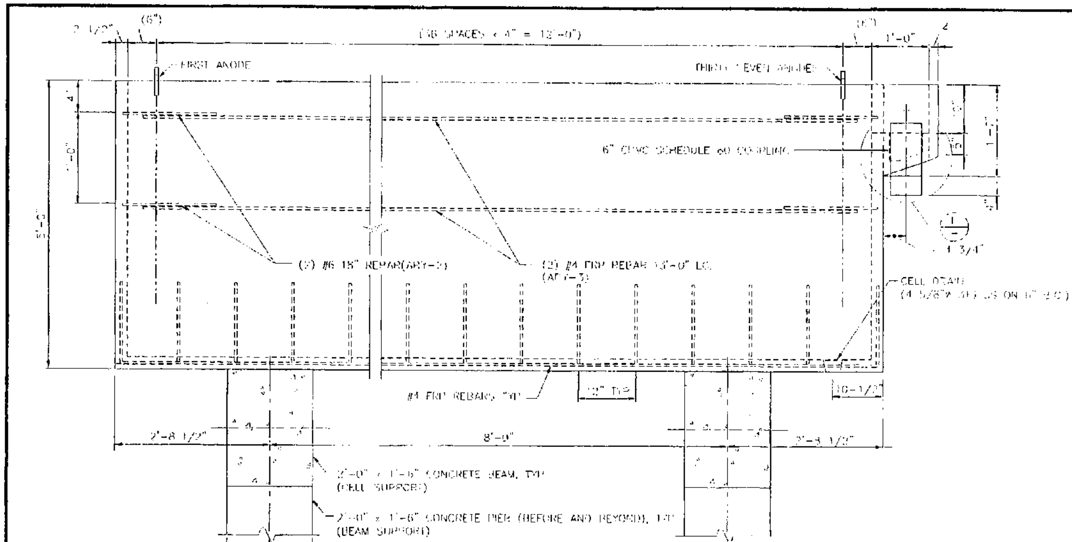
SHEET 1 OF 1

REVISION

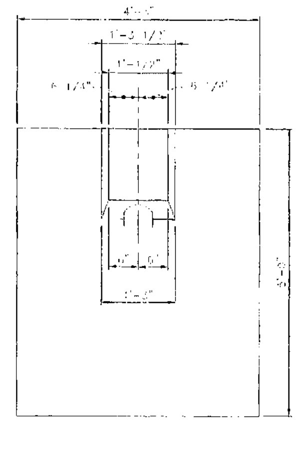
SCALE: AS INDICATED

PROJECT NO 2012-01

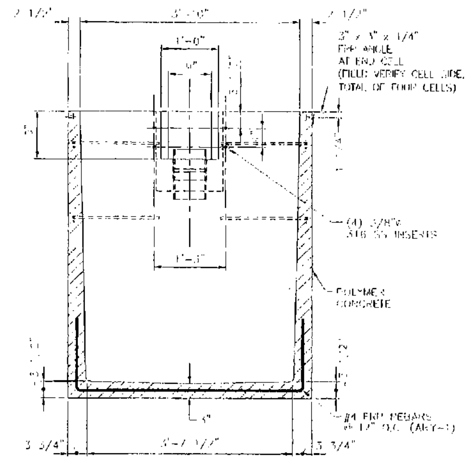
WESTERN STATES ENGINEERING
5210 E. Williams Circle, Suite 700
TUCSON, AZ 85711
PHONE 520-889-2040 FAX 800-898-2933



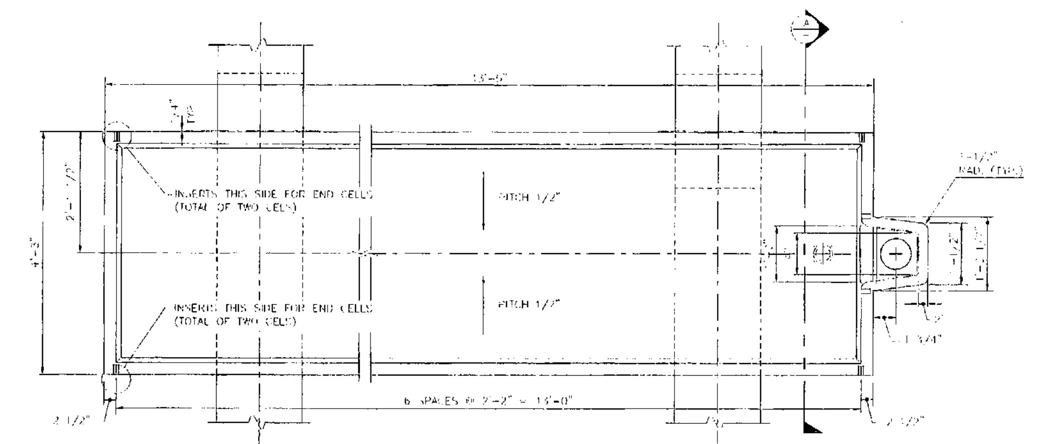
SIDE VIEW
SCALE: 1"=1'-0"



END VIEW
SCALE: 1"=1'-0"



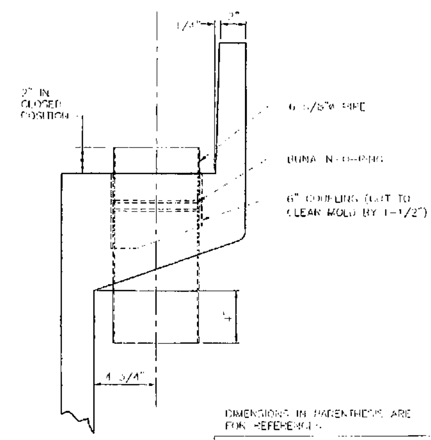
SECTION (A)
SCALE: 1"=1'-0"



PLAN VIEW
SCALE: 1"=1'-0"

GENERAL NOTES:

1. SUPPORT CELLS AT 1/4" POINTS DURING SHIPMENT AND STORAGE. SUPPORTS MUST BE LEVEL OR UNIFORM SO THE CELLS ARE NOT WARPED.
2. ESTIMATED WEIGHT OF UNICELL IS [illegible] LBS
3. ALL FLANGED CONNECTIONS TO UNICELL REQUIRE FULL FACE GASKETS WITH MAXIMUM 40 DUROMETER HARDNESS A. WHEN USING CRANES AND FORKLIFT TO HANDLE THE PRODUCT, USE SOFT PADS AND CORNER GUARDS TO PROTECT EDGES AND CELLCAT SURFACES.



DETAIL (1)
SCALE: 3"=1'-0"

DIMENSIONS IN PARENTHESIS ARE FOR REFERENCE.

REFERENCE DRAWING: 40-CN-02 (OF MINE, ELECTROWINNING, CONCRETE CELL DETAILS, PROJECT # 38010)

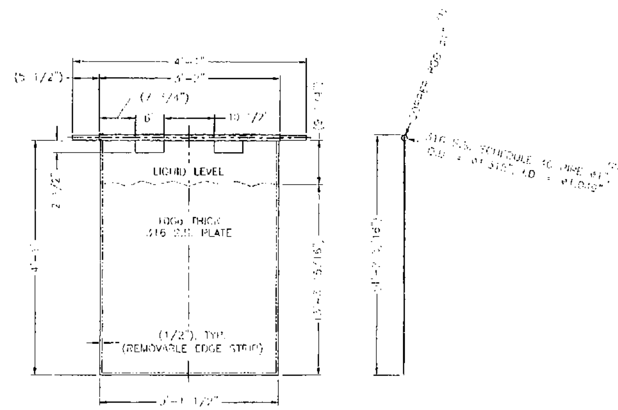
PRELIMINARY
NOT FOR CONSTRUCTION
11-06-2013

CS Mining LLC	
PROJECT NO 2012-01	WESTERN STATES ENGINEERING, 5210 E. Williams Circle Suite 700, TUCSON, AZ 85711
REV P1	FIRST REVIEW
DRAWN BY	DATE 11/05/13

COPPER LEACH/CCD PROJECT - PHASE 1
SOLVENT EXTRACTION, ELECTROWINNING
ELECTROWINNING
POLYMER CONCRETE - CELL DETAILS

SCALE: AS NOTED

DRAWING NO. 40-CN-02
SHEET 1 of 1
REVISION P1



FRONT ELEVATION

SIDE ELEVATION

CATHODE ASSEMBLY

SCALE: 1"=1'-0"

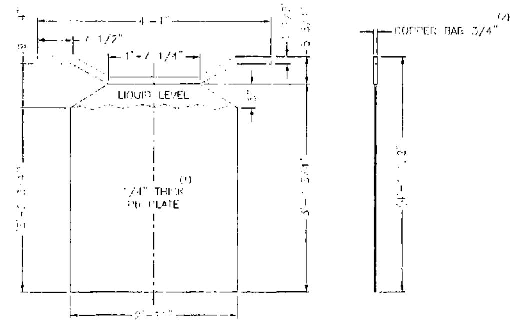
DIMENSIONS IN PARENTHESIS ARE FOR REFERENCES.

——— - LIMIT OF REMOVABLE EDGE STRIP.

CATHODE WORKING AREA: 10 FT^2.

(1) COPPER ROD PRESSED IN PIPE. PIPE THEN CRIMP FLATTENED OVER ENTIRE CATHODE PLATE WIDTH

(2) PIPE TO PLATE ATTACHMENT. 1/8" CONTINUOUS, BOTH SIDES, FILLET WELD



FRONT ELEVATION

SIDE ELEVATION

Pb ANODE ASSEMBLY

SCALE: 1"=1'-0"

DIMENSIONS IN PARENTHESIS ARE FOR REFERENCES.

PROVIDE FIVE ANODE BUTTONS FROM NON-CONDUCTIVE MATERIAL IN CORNERS AND CENTER OF PLATE

(1) Pb PLATE SPECIFICATION: 0.05% ... 0.1% Ca,
1.25% ... 1.75% Sn,
0.005% ... 0.02% Al

(2) COPPER BAR W/ 6% Sn-Pb OVERCAST ON PLATE FOR ATTACHMENT.

PRELIMINARY
NOT FOR CONSTRUCTION
11-06-2013

CS Mining LLC

PROJECT NO 2012-01

WESTERN STATES ENGINEERING
5210 E. Williams Circle, Suite 700
TUCSON, AZ 85711

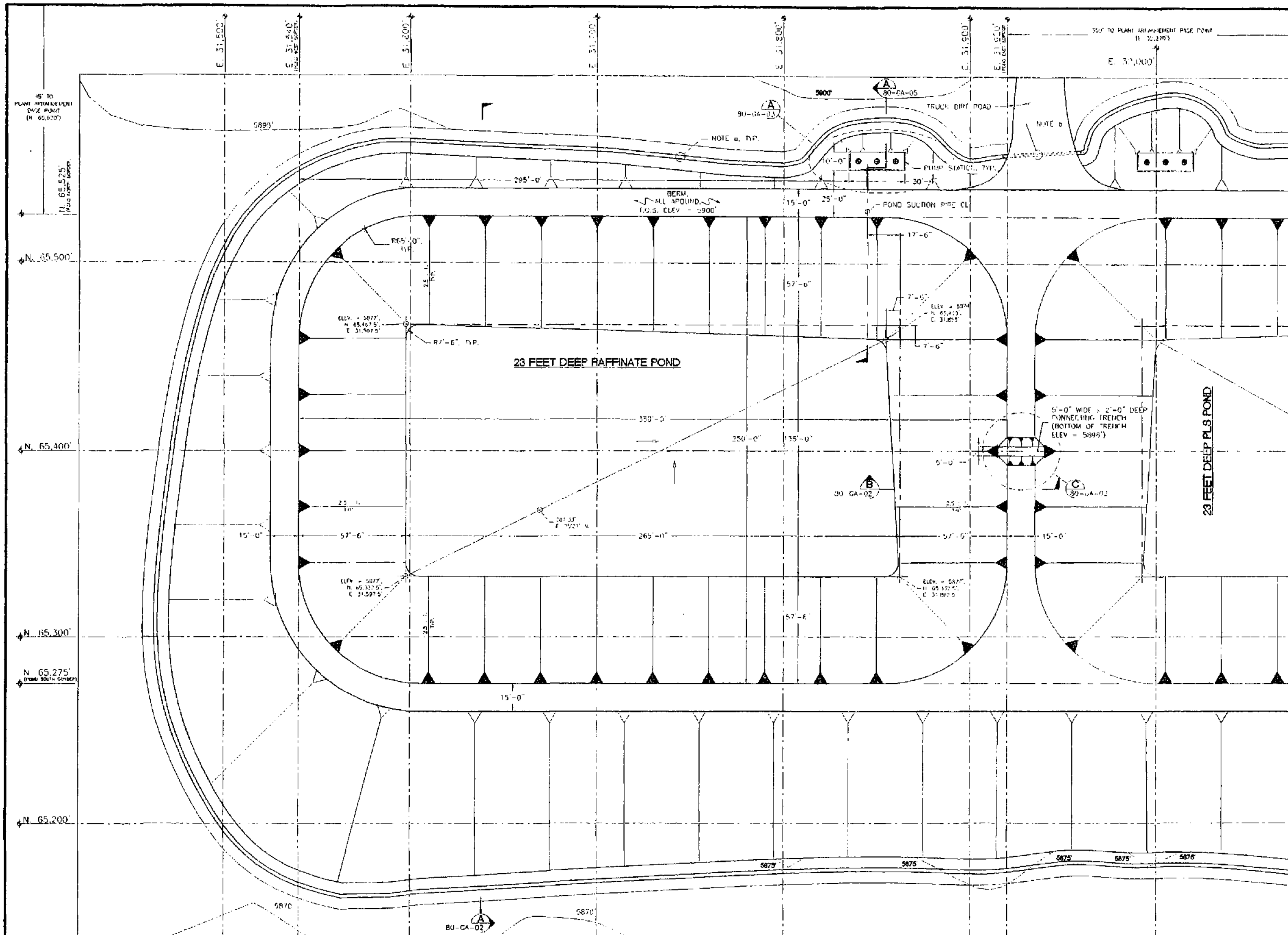
COPPER LEACH/CCD PROJECT - PHASE 1
SOLVENT EXTRACTION, ELECTROWINNING
ELECTROWINNING
MECHANICAL - CATHODE AND ANODE DETAILS

SCALE: AS NOTED

DRAWING NO. 40-M-02

SHEET 1 OF 1

Appendix B
Solution Pond Design Drawings



NOTES

F.V. ALL DIMENSIONS AND CONDITIONS.

DESIGN FOR 23' DEEP RAFFINATE POND IS SHOWN
DESIGN FOR 23' DEEP PLS POND ARE SIM
SEE DWG 30-GA-01 FOR THESE TWO PONDS GENERAL ARRANGEMENT

TRUCK DIRT ROAD EMBANKMENTS TOWARD E. SOIL AREN'T SHOWN.

a) DRAINAGE SWALE.
SWALE OR DRAINAGE DITCH SHALL BE BUILT AROUND PONDS SYSTEM AND TO BE SLOPED TOWARD E. DRAINAGE AS SHOWN.
F.V. E. DRAINAGE LOCATION
SWALE SLOPE SHALL BE: 0.005 ft/ft (MIN. SLOPE) ... 0.02 ft/ft (MAX. SLOPE).
SWALE SHALL BE 2'-0" MIN. DEEP AND 12'-0" WIDE AT BOTTOM
SWALE SIDES SHALL HAVE RATIO OF 3:1.

(b) INSTALL 1'-6"ø MIN. HDPE CULVERT UNDER TRUCK DIRT ROAD W/ A MIN. COVER A 2'-0" OVER TOP OF PIPE.

POND LINING SYSTEM:
POND LINING SYSTEM SHALL CONSISTS OF FOUR LAYERS
- FIRST (UPPER) LAYER: 60 mils XR-5 OR HDPE AT OWNER DISCRETION.
- SECOND LAYER: GEONET (W/ FABRIC BOTH SIDES).
- THIRD LAYER: 60 mils HDPE.
- FOURTH (BOTTOM) LAYER: 32 oz GEOTEXTILE OR 12" CLAY SOIL COMPACTED TO 90% ASTM D1557, INSTALLED IN (2) 6" LIFTS.

EMBANKMENTS:
THE BERMS ON THE SOUTH WILL BE CONSTRUCTED OF SOIL REMOVED FROM THE BOTTOM, AND THE BERM ON THE NORTH SIDE WILL CONSIST OF NATURAL SOIL LEFT IN PLACE AFTER REMOVALS ARE FINISHED.

THE SLOPE OF ALL EMBANKMENTS CONSTRUCTED OF THE SOIL CURRENTLY EXISTING ON THE SURFACE SHOULD BE LIMITED TO A RATIO OF 2.5:1 (POND EMBANKMENT) AND 3:1 (BERM EMBANKMENT).

IN THE AREA OF THE EMBANKMENTS, THE SURFACE SHOULD BE SCARIFIED TO A DEPTH OF 6 INCHES AND WATERED TO SLIGHTLY OVER THE OPTIMUM MOISTURE CONTENT AND COMPACTED TO A MINIMUM OF 95 PERCENT OF THE MAXIMUM DRY DENSITY AS DETERMINED BY THE ASTM D1557, "PROCTOR" TEST.

ALL EMBANKMENT FILL SHOULD BE PLACED IN 10" LIFTS AND COMPACTED TO A MINIMUM OF 95 PERCENT OF THE MAXIMUM DRY DENSITY FOR GRANULAR SOILS AND A MINIMUM OF 90 PERCENT FOR CLAYEY SOILS.
THE SIDES OF THE EMBANKMENT SHOULD BE EITHER COMPACTED OR OVERBUILT AND TRIMMED BACK TO COMPACTED SOIL.

SOIL MATERIALS:
DRAINAGE FILL CONSISTS OF WASHED, EVENLY GRADED MIXTURE OF CRUSHED STONE, OR CRUSHED OR UNCRUSHED GRAVEL, ASTM D 448, COARSE AGGREGATE, SIZE NO. 57, WITH 100 PERCENT PASSING 1-1/2 INCH (37.5 MM) SIEVE AND NOT MORE THAN 5 PERCENT PASSING NO. 8 (2.36 MM) SIEVE

LEGEND

- BERM.
- SWALE.
- SLOPE DIRECTION OF POND.
- SLOPE DIRECTION OF BERM EMBANKMENT TOWARD BOTTOM OF POND/LEAK DETECTION SUMP/CONNECTING TRENCH.
- SLOPE DIRECTION TOWARD NATURAL GROUND.

RAFFINATE POND PLAN (A)

SCALE: 1" = 25'-0"

SEE SHT-2 FOR EAST PART OF PLS POND LAYOUT

PROJECT NORTH

PRELIMINARY
NOT FOR CONSTRUCTION
01-27-2014

TOLERANCE UNLESS OTHERWISE SPECIFIED — FRACTIONS ± ; 0.00 ± ; 0.000 ±

CS Mining LLC

REV	DESCRIPTION	BY	DATE
P1	FIRST REVIEW	HM	12/06/13
P2	SECOND REVIEW	HM	01/27/14

PROJECT NO 2012-01
WESTERN STATES ENGINEERING
5210 E. Williams Circle, Suite 700
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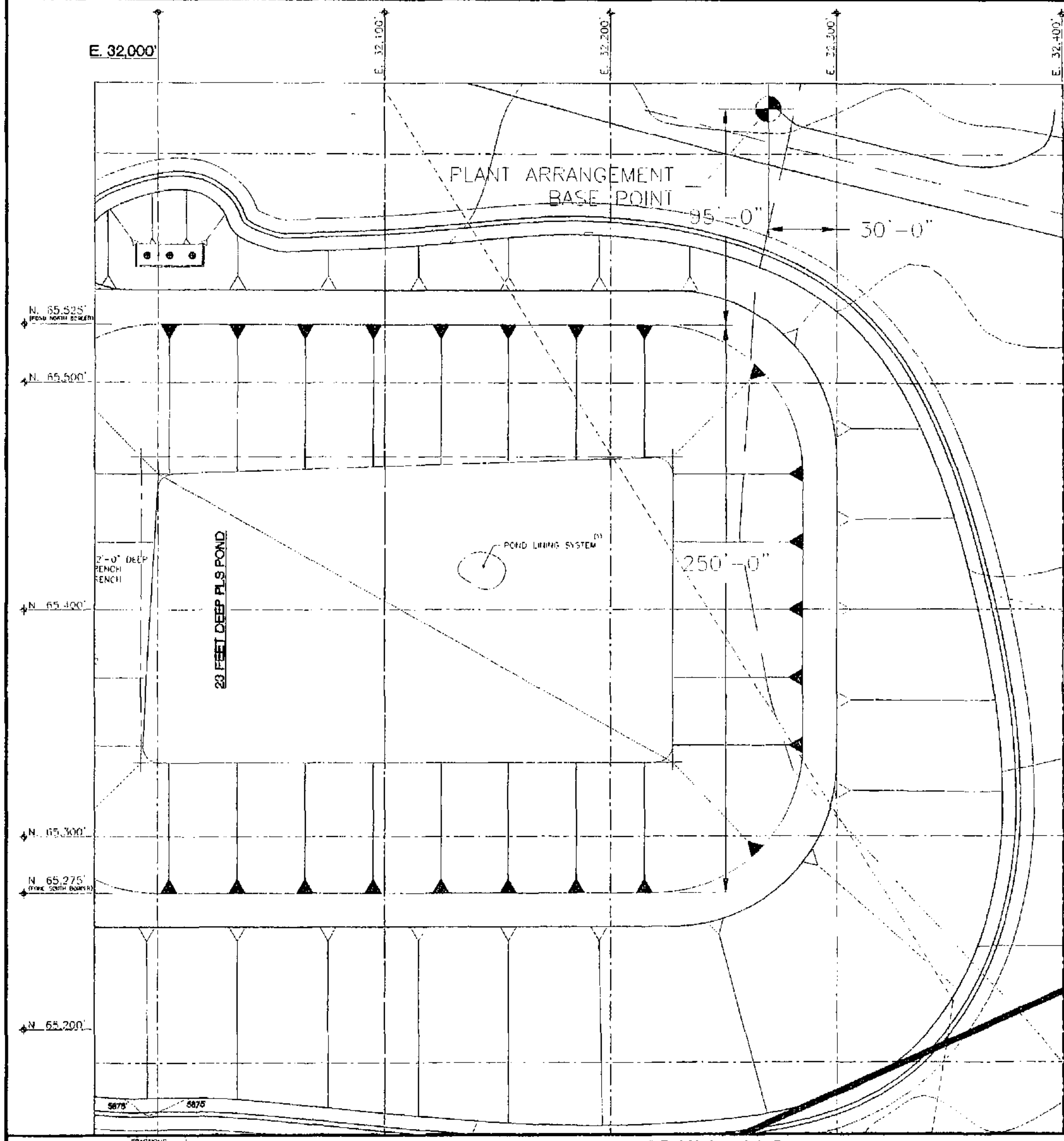
APPROVED FOR CONSTRUCTION: SAFETY; ENVIRONMENTAL; MAINTENANCE; PRODUCTION; QLTY. CONTROL; PROCESS ENGR.; PROJECT ENGR.; ENGR. MNGR.; PLANT MNGR.

DESIGN		DATE
DRAWN BY	AM	1/07/13
PROJ. ENGR.	FM	
ENGR. MNGR.		

COPPER LEACH/CCD PROJECT - PHASE 1
SOLVENT EXTRACTION, ELECTROWINNING
PONDS
PLS AND RAFFINATE POND LAYOUT

SCALE: AS NOTED

DRAWING NO: 80-GA-01 — SHEET 1 OF 2 — REVISION P2



PLAN

SCALE: 1" = 25'-0"

PROJECT NORTH

SEE SHT-1 FOR WEST PART OF PLS/RAFFINATE POND LAYOUT.

SEE SHT-1 FOR INFORMATION NOT SHOWN.

(1) POND LINING SYSTEM

1st LAYER	–	80 mil HDPE OR SR-S.
2nd LAYER	–	GEONET W/ FABRIC BOTH SIDES.
3rd LAYER	–	60 mil HDPE.
4th LAYER	–	32 oz GEOTEXTILE OR
		12" CLAY SOIL COMPACTED IN 2X 6" LIFTS TO MIN. 90% ASTM D1557 FOR K=10⁻⁷ cm/sec COMPACTING.

PRELIMINARY
NOT FOR CONSTRUCTION
01-27-2014

TOLERANCE UNLESS OTHERWISE SPECIFIED — FRACTIONS ±, 0.00 ±, 0.000 ±

CS Mining LLC

REVISIONS (DESTROY ALL PRINTS OF AN EARLIER DATE THAN LATEST REVISION)

REV	DESCRIPTION	BY	DATE
P1	FIRST REVIEW	HM	12/06/13
P2	SECOND REVIEW	HM	01/27/14

PROJECT NO 2012-01

WESTERN STATES ENGINEERING
5210 E. Williams Circle, Suite 700
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PHONE: 520-882-0040 FAX: 520-880-2733

APPROVED FOR CONSTRUCTION

	BY	DATE		BY	DATE
SAFETY			PROCESS ENGR.		
ENVIRONMENTAL			PROJECT ENGR.		
MAINTENANCE			ENGR. MNGR.		
PRODUCTION			PLANT MNGR.		
QLTY. CONTROL					

DESIGN		DATE
DRAWN BY	AM	11/06/13
PROJ. ENGR.	HM	
ENGR. MNGR.		

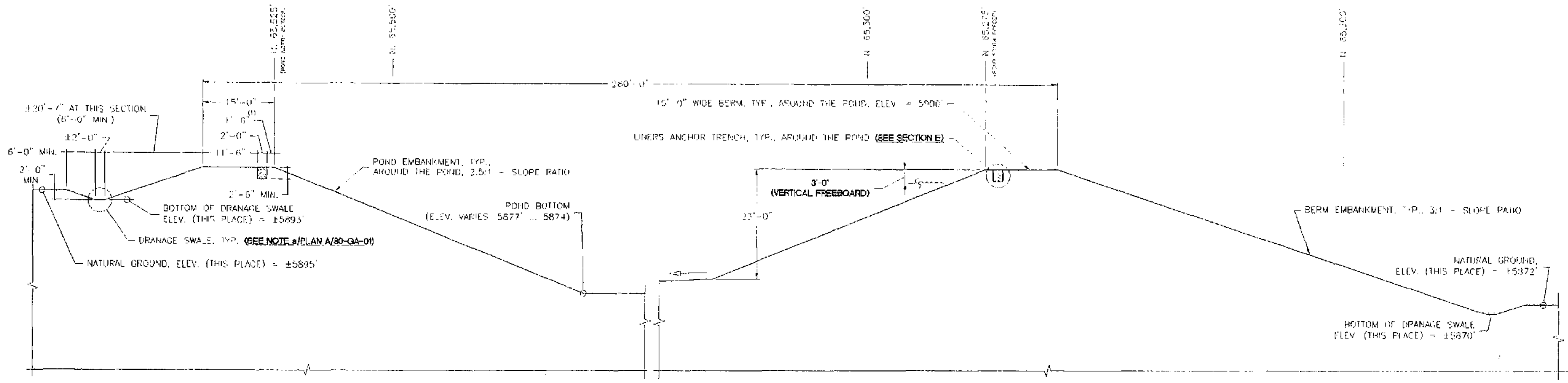
COPPER LEACH/CCD PROJECT - PHASE 1
SOLVENT EXTRACTION, ELECTROWINNING
PONDS
PLS AND RAFFINATE POND LAYOUT

SCALE: AS NOTED

DRAWING NO. 80-GA-01

SHEET 2 OF 2

REVISION P2



POND SECTION (A / 80-GA-01)

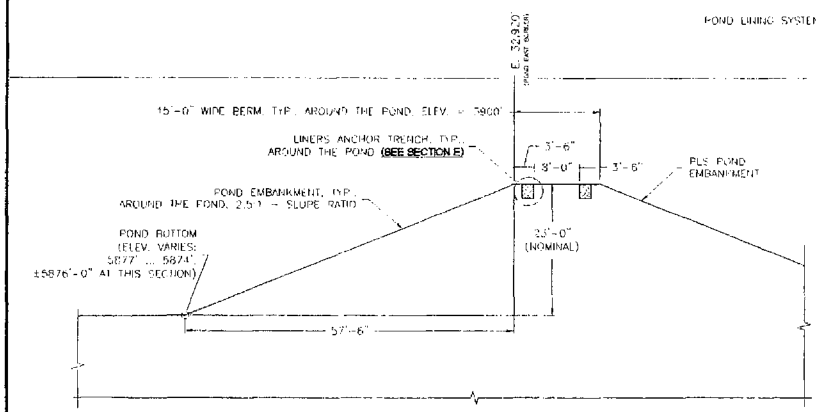
SCALE: 1" = 10'-0" LOOKING EAST

THIS SECTION PLANE IS AT E. 31,640'.

POND LINING SYSTEM ISN'T SHOWN.

⟵ - SLOPE OF POND BOTTOM IN NORTH-SOUTH DIRECTION.

(1) PROVIDE VENTS IN TOP LINER THIS AREA, AROUND THE POND AT INTERVALS PER LINER INSTALLER/MANUFACTURER SPECIFICATIONS.



POND SECTION (B / 80-GA-01)

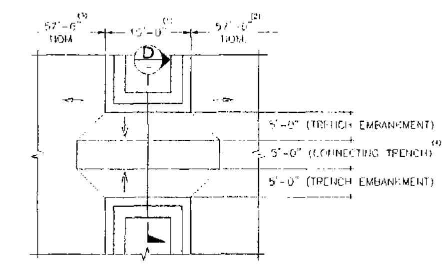
SCALE: 1" = 10'-0" LOOKING NORTH

THIS SECTION PLANE IS AT N. 65,400'.

POND LINING SYSTEM ISN'T SHOWN.

SEE SECTION A FOR INFORMATION NOT SHOWN.

⟶ - SLOPE OF POND BOTTOM IN EAST-WEST DIRECTION.



- LINING SYSTEM.
- LINER SYSTEM ANCHOR TRENCH (2'-0" WIDE × 2'-6" DEEP) SEE SECTION E.

CONNECTING TRENCH PLAN (C / 80-GA-01)

SCALE: 1" = 10'-0"

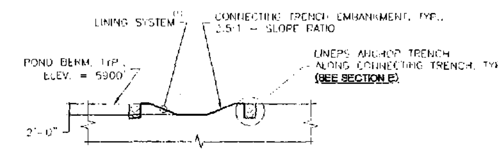
PROJECT NORTH

(1) BERM BETWEEN RAFFINATE AND PLS PONDS.

(2) RAFFINATE POND EMBANKMENT.
⟵ - POND EMBANKMENT SLOPE (2.5:1)

(3) PLS POND EMBANKMENT.
⟵ - POND EMBANKMENT SLOPE (2.5:1)

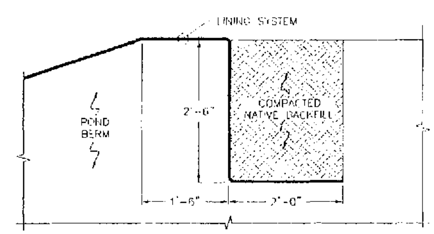
(4) BOTTOM OF CONNECTION TRENCH ELEV. = 5898'
⟵ - TRENCH EMBANKMENT SLOPE (2.5:1)



SECTION (D)

SCALE: 1" = 10'-0" LOOKING EAST

(1) LINER SYSTEMS OF RAFFINATE POND AND PLS POND SHALL HAVE A 12" MIN. OVERLAPPING. FUSION, 1st LAYERS OF LINING SYSTEM AND 3rd LAYERS OF LINING SYSTEM PER MANUFACTURER RECOMMENDATIONS.



LINER ANCHOR TRENCH SECTION (E)

SCALE: 1" = 1'-0"

PRELIMINARY
NOT FOR CONSTRUCTION
01-27-2014

TOLERANCE UNLESS OTHERWISE SPECIFIED: FRACTIONS ±, 0.00 ±, 0.000 ±

CS Mining LLC

REV	DESCRIPTION	BY	DATE
P1	FIRST REVIEW	HM	12/05/13
P2	SECOND REVIEW	HM	01/27/14

PROJECT NO 2012-01

WESTERN STATES ENGINEERING
5210 E. Williams Circle, Suite 700
TUCSON, AZ 85711
PHONE: 520-880-0040 FAX: 520-880-2733

APPROVED FOR CONSTRUCTION: SAFETY, ENVIRONMENTAL, MAINTENANCE, PRODUCTION, QLTY. CONTROL, PROCESS ENGR, PROJECT ENGR, ENGR. MNGR, PLANT MNGR

DESIGN: DRAWN BY AM, DATE 11/06/13; PROJ. ENGR FM; ENGR. MNGR

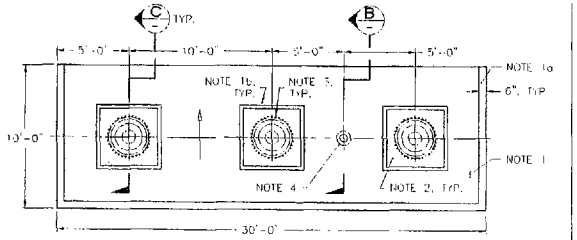
COPPER LEACH/CCD PROJECT - PHASE 1
SOLVENT EXTRACTION, ELECTROWINNING
PONDS
SECTIONS AND DETAILS

SCALE: AS NOTED

DRAWING NO. 80-GA-02

SHEET 1 OF 1

REVISION P2



SURFACE PLAN - PUMP STATION PAD (A)

SCALE: 1/4" = 1'-0" 80-GA-01 PROJECT NORTH

(1) 6" THICK CONCRETE SLAB (T.O.C. ELEV = 5896'-6")

⟶ —— ⟵ – SLAB SLOPE (±)1/4" PER FOOT)

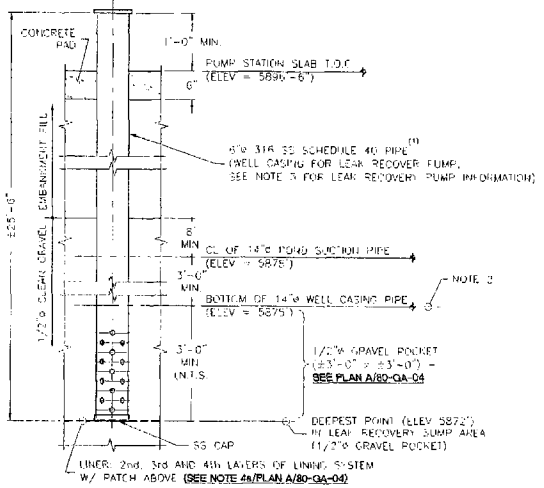
(1a) CONCRETE CURB (T.O.C. ELEV = 5897'-3" MAX.)

(1b) PUMP CONCRETE PAD (T.O.C. ELEV = 5896'-9").

(2) PUMP STEEL SOLE PL (T.O.S. ELEV = 5897'-0").

(3) VERTICAL TURBINE PUMP.

(4) 6"ø WELL CASING PIPE FOR LEAK RECOVER PUMP.



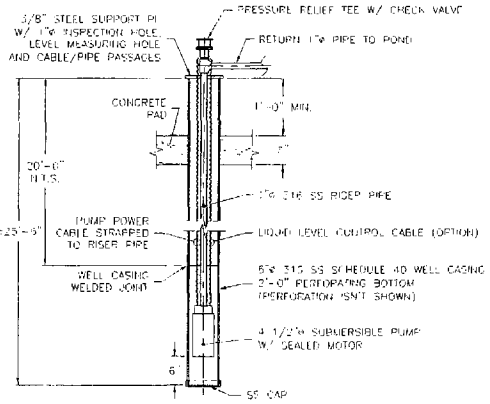
WELL CASING AND LEAK RECOVER PUMP SECTION (B)

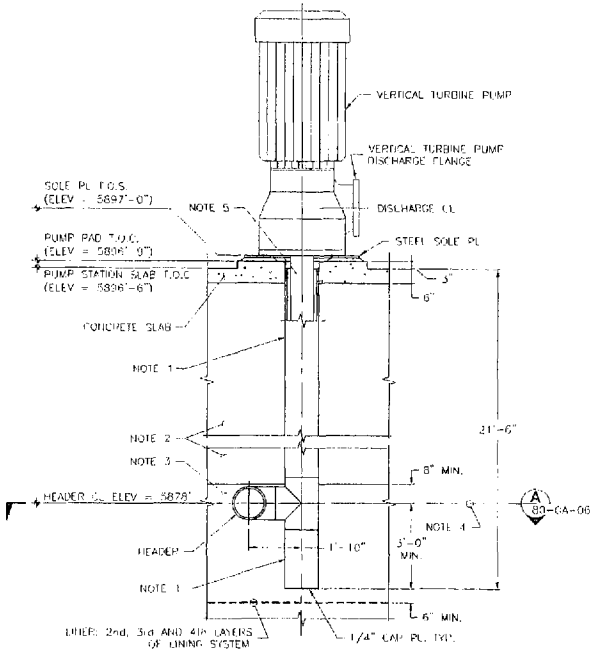
SCALE: 1" = 1'-0" LOOKING WEST

(1) PIPE SHALL HAVE WATER-PROOF JOINT W/ CONCRETE SLAB PIPE SHALL HAVE 2'-0" PERFORATING BOTTOM; LAYERS OF 4X EQUALLY SPACED 1"ø HOLES AT 2" O.C. HOLES SHALL BE STAGGERED.

(2) BOTTOM OF 1/2"ø CLEAN GRAVEL BED (LEAK RECOVERY SUMP) SEE PLAN A/80-GA-04 AND SECTION A/80-GA-05.

(3) LEAK RECOVERY PUMP SCHEMATIC DTL:





WELL CASING FOR SOLUTION RECOVERY SECTION (C)

SCALE: 1/2" = 1'-0" LOOKING WEST

(1) WELL CASING PIPE = 14"ø STANDARD WEIGHT 316 SS PIPE. PIPE SHALL HAVE WATER PROOF JOINT W/ CONCRETE SLAB.

(2) EMBANKMENT FILL.

(3) 1/2"ø CLEAN GRAVEL.

(4) BOTTOM OF VERTICAL TURBINE PUMPS BOWLS (BOTTOM OF STRAINER)

(5) SHAFT COLUMN ASSEMBLY OF VERTICAL TURBINE PUMP W/ BOWL UNIT AT THE END OF COLUMN ASSEMBLY.

PRELIMINARY
NOT FOR CONSTRUCTION
01-27-2014

TOLERANCE UNLESS OTHERWISE SPECIFIED: FRACTIONS ±; DIM ±; DEC ±

REV	DESCRIPTION	BY	DATE
P1	FIRST REVIEW	HM	12/05/13
P2	SECOND REVIEW	HM	01/27/14

REV	DESCRIPTION	BY	DATE

CS Mining LLC

PROJECT NO 2012-01

WESTERN STATES ENGINEERING
5210 E. Williams Circle, Suite 700
TUCSON, AZ 85711
PHONE: 520-382-0040 FAX 520-809-2219

APPROVED FOR CONSTRUCTION	BY	DATE		BY	DATE
SAFETY			PROCESS ENGR.		
ENVIRONMENTAL			PROJECT ENGR.		
MAINTENANCE			ENGR. MAJOR		
PRODUCTION			PLANT MNGR.		
QLTY CONTROL					

DESIGN	DATE
DRAWN BY AV	11/05/13
PROJ. ENGR. HM	
ENGR. MAJOR	

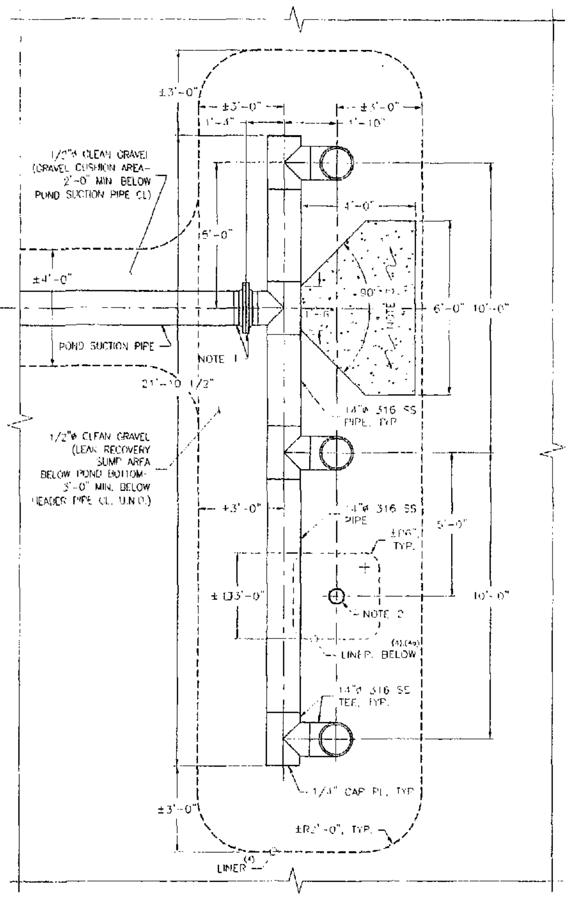
COPPER LEACH/CCD PROJECT - PHASE 1
SOLVENT EXTRACTION, ELECTROWINNING
PONDS
SOLUTION/LEAK RECOVERY. SECTIONS AND DETAILS

SCALE: AS NOTED

DRAWING NO. 80-GA-03

SHEET 1 OF 1

REVISION P2



LEAK RECOVERY SUMP AND HEADER PLAN

(A / 80-GA-03) PROJECT NORTH

SCALE: 1/2" = 1'-0"

THIS SECTION IS SHOWN AT HEADER ELEV = 5878'

WELD TEE TO PIPE/FLANGE/CAP PL SHALL BE: V-GROOVE OR BEVEL-GROOVE WELD ALL AROUND W/ 1/8" MIN. PENETRATION AND CONVEX CONTOUR.

(1) FLANGES SHALL BE 14"Ø 316 SS RFWN FLANGES.

(2) 6"Ø 316 SS SCHEDULE 40 WELL CASING PIPE FOR LEAK RECOVER PUMP.

(3) 2'-0" HIGH CONCRETE ANCHOR/THRUST BLOCK.
T.O.C. ELEV SHALL BE 1'-0" ABOVE POND SUCTION PIPE/TEE CL.
CONCRETE SHALL BE TYPE 'V' (3000 psi, 28 DAYS)

(4) LINER: 2nd, 3rd AND 4th LAYERS OF LINING SYSTEM

(4a) THIS LINER FORMS GRAVEL POCKET UNDER WELL CASING
(LEAK RECOVERY: SEE SECTION B/80-GA-03).
PROVIDE ±3'-0" x 3'-0" x 80 mils VR-5 OR HDPE PATCH
AT BOTTOM OF POCKET (ON TOP OF 2nd LAYER OF LINING SYSTEM,
DO NOT WELD THIS PATCH TO THIS LINER).

LEAK RECOVERY NOTES:

1. MAX. CAPACITY LEAK RECOVERY SUMP BELOW POND BOTTOM: 320 FT^3 WITH 25% POROSITY: 600 gal.
2. LEAK RECOVERY WELL SHALL BE EQUIPPED WITH ELECTRIC SUBMERSIBLE PUMP AND 1"Ø RISER PIPE FOR SUMP EVACUATION/LEAK RECOVERY.
   DISCHARGE WILL BE MEASURED BY FLOW TOTALIZER.
   PUMP TO BE ACTIVATED BY ELECTRIC LEVEL SENSORS OR MANUAL SWITCH FOLLOWING LEVEL SOUNDING OF RECOVERY WELL
3. POND LINED AREA: 195,790 FT^3 OR 4.6 ACRES TOTAL OR 2.3 ACRES PER POND.

PRELIMINARY
NOT FOR CONSTRUCTION
01-27-2014

TOLERANCE UNLESS OTHERWISE SPECIFIED	FRACTIONS ± / 0.00 ± / 0.000 ±

CS Mining LLC

REVISIONS

REV	DESCRIPTION	BY	DATE
P1	FIRST REVIEW	HM	12/16/13
P2	SECOND REVIEW	HM	01/27/14

PROJECT NO 2012-01

WESTERN STATES ENGINEERING
5210 E. Williams Circle, Suite 700
TUCSON, AZ 85711
PHONE: 520-889-2010 FAX: 520-889-2703

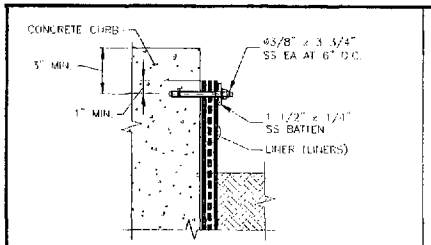
APPROVED FOR CONSTRUCTION: SAFETY, ENVIRONMENTAL, MAINTENANCE, PRODUCTION, QLTY. CONTROL, PROCESS ENGR., PROJECT ENGR., ENGR. MNGR., PLANT MNGR.

DESIGN: DRAWN BY HM, DATE 11/05/13; PROJ. ENGR. HM; ENGR. MNGR.

COPPER LEACH/CCD PROJECT - PHASE 1
SOLVENT EXTRACTION, ELECTROWINNING
PONDS
SOLUTION/LEAK RECOVERY, PLAN AND NOTES

SCALE: AS NOTED

DRAWING NO: 80-GA-04 | SHEET 1 OF 1 | REVISION P2



TYPICAL LINER TERMINATION DETAIL (A1)

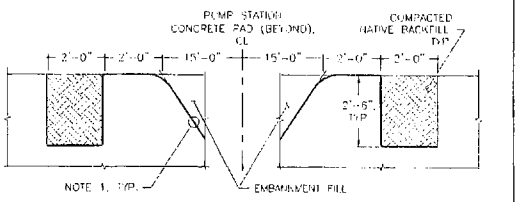
SCALE: 3" = 1'

CONTRACTOR MAY USE ANOTHER TYPE OF LINER TERMINATION AT OWNER DISCRETION.

EARTH ADJACENT TO CONCRETE TO BE WELL COMPACTED TO PREVENT FUTURE DIFFERENTIAL SETTLEMENT.

CONCRETE TO BE CHAMFERED A MINIMUM OF 1" AT ALL CORNERS IN CONTACT WITH LINER.

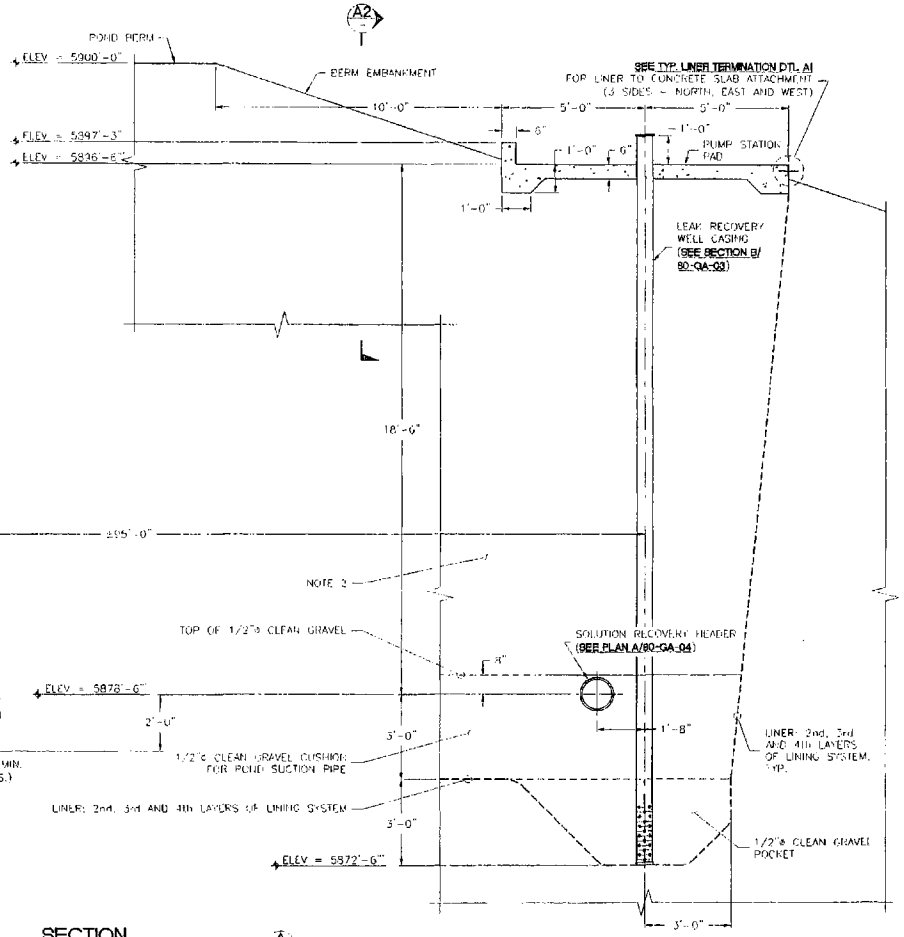
THIS IS A CONCEPTUAL DETAIL FOR INFORMATION NOT SHOWN CONTACT WITH LINER MANUFACTURER.



LINER ANCHOR TRENCHES SECTION (A2)

SCALE: 1" = 1'-0" LOOKING NORTH

(1) LINER: 2nd, 3rd AND 4th LAYERS OF LINING SYSTEM. THIS LINER FORMS ±4'-0" WIDE (AT POND SUCTION PIPE ELEV) TRENCH FOR 1/2"ø CLEAN GRAVEL CUSION. BOTTOM OF TRENCH: 3'-0" BELOW OF PIPE CL. LINER IS ATTACHED TO PUMP STATION CONCRETE PAD BEYOND (SEE DTL A1) AND ANCHORED IN POND LINER ANCHOR TRENCH BEFORE (NORTH SIDE OF POND).



SECTION (A)

SCALE: 1/2" = 1'-0" LOOKING WEST 80-GA-01

(1) POND SUCTION PIPE = 14"ø STANDARD WEIGHT 316 SS PIPE. ——→—— = PIPE SLOPE DIRECTION (1/4" MIN. PER FOOT).

(1a) SS BANDING, TYP (PIPE BOOT).

(2) EMBANKMENT FILL

(3) 1/2"ø CLEAN WELL ROUNDED GRAVEL (POND SUCTION PIPE CUSION) SEE MATERIAL SPECIFICATIONS.

PRELIMINARY
NOT FOR CONSTRUCTION
01-27-2014

TOLERANCE UNLESS OTHERWISE SPECIFIED	FRACTIONS ± 0.0" ± 0.000" ±
ALL DIMENSIONS IN DECIMAL FEET UNLESS OTHERWISE SPECIFIED	

REV	DESCRIPTION	BY	DATE
P1	FIRST REVIEW	HM	07/01/13
P2	SECOND REVIEW	HM	01/27/14

REV	DESCRIPTION	BY	DATE

CS Mining LLC

PROJECT NO 2012-01

WESTERN STATES ENGINEERING
5210 E. Williams Circle, Suite 700
TUCSON, AZ 85711
PHONE: 520-889-2940 FAX: 520-889-2935

APPROVED FOR CONSTRUCTION	BY	DATE		BY	DATE
SAFETY			PROCESS ENGR.		
ENVIRONMENTAL			PROJECT ENGR.		
MAINTENANCE			ENGR. MNGR.		
PROTOCOL			PLANT MNGR.		
QUALITY CONTROL					

DESIGN	DATE
DRAWN BY AM	01/06/13
PROJ. ENGR. HM	
ENGR. MNGR.	

COPPER LEACH/CCD PROJECT - PHASE 1
SOLVENT EXTRACTION, ELECTROWINNING
PONDS
SOLUTION/LEAK RECOVERY, SECTION AND DETAIL

SCALE: AS NOTED

DRAWING NO.	SHEET
80-GA-05	1 OF 1
REVISION	P2

Appendix C
Tailings Analysis Results for
Metallurgical Bench Test Sample

ALS USA Inc.
4977 Energy Way
Reno NV 89502
Phone: 775 356 5395 Fax: 775 355 0179 www.alsglobal.com

MCCLELLAND LABS
1016 GREG ST
SPARKS NV 89431

Finalized Date: 12- JUN- 2013
Account: EIM

CERTIFICATE RE13103784

Project: 3800
P.O. No.:
This report is for 1 Pulp sample submitted to our lab in Reno, NV, USA on 7- JUN- 2013.
The following have access to data associated with this certificate:

CHRISTINE DEBURLE	JACK MCPARTLAND	

SAMPLE PREPARATION

ALS CODE	DESCRIPTION
WEI- 21	Received Sample Weight
LOG- 24	Pulp Login - Rcd w/o Barcode

ANALYTICAL PROCEDURES

ALS CODE	DESCRIPTION	INSTRUMENT
Hg- CV41	Trace Hg - cold vapor/AAS	FIMS
ME- MS61	48 element four acid ICP- MS	

The results of this assay were based solely upon the content of the sample submitted. Any decision to invest should be made only after the potential investment value of the claim or deposit has been determined based on the results of assays of multiple samples of geological materials collected by the prospective investor or by a qualified person selected by him/her and based on an evaluation of all engineering data which is available concerning any proposed project. Statement required by Nevada State Law NRS 519

To: MCCLELLAND LABS
ATTN: JACK MCPARTLAND
1016 GREG ST
SPARKS NV 89431

This is the Final Report and supersedes any preliminary report with this certificate number. Results apply to samples as submitted. All pages of this report have been checked and approved for release.

***** See Appendix Page for comments regarding this certificate *****

Signature:
Colin Ramshaw, Vancouver Laboratory Manager

ALS USA Inc.
4977 Energy Way
Reno NV 89502
Phone: 775 356 5395 Fax: 775 355 0179 www.alsglobal.com

[redacted]: MCCLELLAND LABS
1016 GREG ST
SPARKS NV 89431

[redacted]age: 2 - A
Total # Pages: 2 (A - D)
Plus Appendix Pages
Finalized Date: 12- JUN- 2013
Account: EIM

Project: 3800

CERTIFICATE OF ANALYSIS RE13103784

Sample Description	Method Analyte Units LOR	WEI- 21 Recvd Wt. kg 0.02	ME- MS61 Ag ppm 0.01	ME- MS61 Al % 0.01	ME- MS61 As ppm 0.2	ME- MS61 Ba ppm 10	ME- MS61 Be ppm 0.05	ME- MS61 Bi ppm 0.01	ME- MS61 Ca % 0.01	ME- MS61 Cd ppm 0.02	ME- MS61 Ce ppm 0.01	ME- MS61 Co ppm 0.1	ME- MS61 Cr ppm 1	ME- MS61 Cs ppm 0.05	ME- MS61 Cu ppm 0.2	ME- MS61 Fe % 0.01
3800- CONT- ACID- 1		0.13	14.15	2.56	81.9	330	0.52	43.9	6.32	0.40	28.7	65.8	13	6.76	1600	18.20

***** See Appendix Page for comments regarding this certificate *****

ALS USA Inc.
4977 Energy Way
Reno NV 89502
Phone: 775 356 5395 Fax: 775 355 0179 www.alsglobal.com

[redacted]: MCCLELLAND LABS
1016 GREG ST
SPARKS NV 89431

[redacted]age: 2 - B
Total # Pages: 2 (A - D)
Plus Appendix Pages
Finalized Date: 12- JUN- 2013
Account: EIM

Project: 3800

CERTIFICATE OF ANALYSIS RE13103784

Sample Description	Method Analyte Units LOR	ME- MS61 Ga ppm 0.05	ME- MS61 Ge ppm 0.05	ME- MS61 Hf ppm 0.1	Hg- CV41 Hg ppm 0.01	ME- MS61 In ppm 0.005	ME- MS61 K % 0.01	ME- MS61 La ppm 0.5	ME- MS61 Li ppm 0.2	ME- MS61 Mg % 0.01	ME- MS61 Mn ppm 5	ME- MS61 Mo ppm 0.05	ME- MS61 Na % 0.01	ME- MS61 Nb ppm 0.1	ME- MS61 Ni ppm 0.2	ME- MS61 P ppm 10
3800- CONT- ACID- 1		11.95	0.14	1.1	0.03	0.941	1.17	18.2	10.4	5.92	3670	61.3	0.45	4.6	11.6	450

***** See Appendix Page for comments regarding this certificate *****

ALS USA Inc.
4977 Energy Way
Reno NV 89502
Phone: 775 356 5395 Fax: 775 355 0179 www.alsglobal.com

MCCLELLAND LABS
1016 GREG ST
SPARKS NV 89431

Finalized Date: 12- JUN- 2013
Account: EIM

Project: 3800

CERTIFICATE OF ANALYSIS RE13103784

Sample Description	Method Analyte Units LOR	ME- MS61 Pb ppm 0.5	ME- MS61 Rb ppm 0.1	ME- MS61 Re ppm 0.002	ME- MS61 S % 0.01	ME- MS61 Sb ppm 0.05	ME- MS61 Sc ppm 0.1	ME- MS61 Se ppm 1	ME- MS61 Sn ppm 0.2	ME- MS61 Sr ppm 0.2	ME- MS61 Ta ppm 0.05	ME- MS61 Te ppm 0.05	ME- MS61 Th ppm 0.2	ME- MS61 Ti % 0.005	ME- MS61 Tl ppm 0.02	ME- MS61 U ppm 0.1
3800- CONT- ACID- 1		72.2	73.5	0.009	2.00	12.15	2.9	1	6.2	161.5	0.42	0.56	4.1	0.120	0.40	9.2

***** See Appendix Page for comments regarding this certificate *****

ALS USA Inc.
4977 Energy Way
Reno NV 89502
Phone: 775 356 5395 Fax: 775 355 0179 www.alsglobal.com

MCCLELLAND LABS
1016 GREG ST
SPARKS NV 89431

Finalized Date: 12- JUN- 2013
Account: EIM

Project: 3800

CERTIFICATE OF ANALYSIS RE13103784

Sample Description	Method Analyte Units LOR	ME- MS61 V ppm 1	ME- MS61 W ppm 0.1	ME- MS61 Y ppm 0.1	ME- MS61 Zn ppm 2	ME- MS61 Zr ppm 0.5
3800- CONT- ACID- 1		41	84.2	6.6	610	37.7

***** See Appendix Page for comments regarding this certificate *****

ALS USA Inc.
4977 Energy Way
Reno NV 89502
Phone: 775 356 5395 Fax: 775 355 0179 www.alsglobal.com

MCCLELLAND LABS
1016 GREG ST
SPARKS NV 89431

Page: Appendix 1
Total # Appendix Pages: 1
Finalized Date: 12- JUN- 2013
Account: EIM

Project: 3800

CERTIFICATE OF ANALYSIS RE13103784

CERTIFICATE COMMENTS

ANALYTICAL COMMENTS

Applies to Method: REE's may not be totally soluble in this method.
ME- MS61

LABORATORY ADDRESSES

Applies to Method: Processed at ALS Reno located at 4977 Energy Way, Reno, NV, USA.
LOG- 24 WEI- 21

Applies to Method: Processed at ALS Vancouver located at 2103 Dollarton Hwy, North Vancouver, BC, Canada.
Hg- CV41 ME- MS61

Table . - Profile II Analytical Results,
Mill Tailings Enviro Project, MWMP Extracts

	Sample
Analysis, mg/L	CONT ACID-1
Alkalinity, $CaCO_3$	31
CO_3, $CaCO_3$	<1.0
HCO_3	38
Aluminum	<0.045
Antimony	0.019
Arsenic	0.022
Barium	0.058
Beryllium	<0.0010
Bismuth	<0.10
Boron	0.61
Cadmium	<0.0010
Calcium	550
Chloride	<10
Chromium	<0.0050
Cobalt	<0.010
Copper	<0.050
Fluoride	1.1
Gallium	<0.10
Iron	<0.010
Lead	<0.0025
Lithium	<0.10
Magnesium	34
Manganese	<0.0050
Mercury	0.00015
Molybdenum	0.18
Nickel	<0.010
Nitrate as N	<1.0
Nitrite as N	<0.25
pH, stu	7.37
Phosphorus	<0.50
Potassium	18
Scandium	<0.100
Selenium	<0.0050
Silver	<0.0050
Sodium	8.1
Strontium	1.5
Sulfate	1,500
Thallium	<0.0010
Tin	<0.10
Titanium	<0.10
Total Dissolved Solids	2,400
Vanadium	0.034
Zinc	<0.010
Cations, meq/L	31.1
Anions, meq/L	31.9
Balance, %	1.4

WET Lab Report # 1306619

7/11/2013

McClelland Laboratory
1016 Greg Street
Sparks, NV 89431
Attn: Mike Medina

OrderID: *1306619*

Dear: Mike Medina

This is to transmit the attached analytical report. The analytical data and information contained therein was generated using specified or selected methods contained in references, such as Standard Methods for the Examination of Water and Wastewater, 18th & 19th editions, Methods for Determination of Organic Compounds in Drinking Water, EPA-600/4-79-020, and Test Methods for Evaluation of Solid Waste, Physical/Chemical Methods (SW846) Third Edition.

The samples were received by WETLAB-Western Environmental Testing Laboratory in good condition on 6/26/2013. Additional comments are located on page 2 of this report.

If you should have any questions or comments regarding this report, please do not hesitate to call.

Sincerely,

Jennifer Delaney
QA Specialist

SPARKS
475 E. Greg Street, Suite 119
Sparks, Nevada 89431
tel (775) 355-0202
fax (775) 355-0817

ELKO
1084 Lamoille Hwy.
Elko, Nevada 89801
tel (775) 777-9933
fax (775) 777-9933

LAS VEGAS
3230 Polaris Ave., Suite 4
Las Vegas, Nevada 89102
tel (702) 475-8899
fax (702) 776-6152

Western Environmental Testing Laboratory
Report Comments

McClelland Laboratory - 1306619

General Comments

None

Specific Comments

The matrix spike/matrix spike duplicate (MS/MSD) values for the analysis of Arsenic on sample 1306619-001 were outside laboratory acceptance criteria; however, the relative percent difference (RPD) value was acceptable, indicating probable matrix interference. The reported result should be considered an estimate.

Due to the sample matrix it was necessary to analyze the following at a dilution:
1306619-001 Chloride, Nitrite Nitrogen and Nitrate Nitrogen
The reporting limits have been adjusted accordingly.

Report Legend

B -- Blank contamination; Analyte detected above the method reporting limit in an associated blank

D -- Reporting limit is elevated due to required sample dilution

DF -- Dilution Factor

HT -- Sample analyzed beyond the accepted holding time

J -- The reported value is between the laboratory method detection limit and the laboratory practical quantitation limit

M -- Reported value is estimated; The sample matrix interfered with the analysis

MCL -- State or EPA Maximum Contamination Level

N -- There was insufficient sample available to perform a spike and/or duplicate on this analytical batch.

NC -- Not calculated due to matrix interference

ND -- Non-detect result; Indicates the result was below the reporting limit (RL)

Q -- Reported value is estimated; The value failed to meet QC criteria for either precision or accuracy

RL -- Reporting Limit or Practical Quantitation Limit

S -- Surrogate recovery was outside of laboratory acceptance limits due to matrix interference. The associated blank and LCS surrogate recovery was within acceptance limits

SC -- Spike recovery not calculated. Sample concentration >4X the spike amount; therefore, the spike could not be adequately recovered

475 East Greg Street Suite #119
Sparks, NV 89431 (775) 355-0202
EPA Lab ID: NV00925 - ELAP No: 25

1084 Lamoille Hwy
Elko, NV 89801 (775) 777-9933
EPA Lab ID: NV00926

3230 Polaris Ave #4
Las Vegas, NV 89102 (702) 475-8899
EPA Lab ID: NV00932

Western Environmental Testing Laboratory
Analytical Report

McClelland Laboratory
1016 Greg Street
Sparks, NV 89431
Attn: Mike Medina
Phone: (775) 356-1300 **Fax:** (775) 356-8917
PO\Project: *3800*

Date Printed: 7/11/2013
OrderID: *1306619*

Customer Sample ID: Cont. Acid 1 MWMP
WETLAB Sample ID: 1306619-001

Collect Date/Time: 6/26/2013 09:00
Receive Date: 6/26/2013 15:30

Analyte	Method	Results		Units	DF	RL	Analyzed
General Chemistry							
Temperature at pH	NA	23.4		°C	1		6/26/2013
pH	SM 4500-H+ B	7.37	HT	pH Units	1		6/26/2013
Bicarbonate (HCO3)	SM 2320B	38		mg/L	1	1.0	6/26/2013
Carbonate (CO3)	SM 2320B	ND		mg/L	1	1.0	6/26/2013
Hydroxide (OH)	SM 2320B	ND		mg/L	1	1.0	6/26/2013
Total Alkalinity	SM 2320B	31		mg/L as CaCO3	1	1.0	6/26/2013
Total Dissolved Solids (TDS)	SM 2540C	2400		mg/L	1	10	7/3/2013
Anions by Ion Chromatography							
Chloride	EPA 300.0	ND		mg/L	10	10	6/27/2013
Fluoride	EPA 300.0	1.1		mg/L	10	1.0	6/27/2013
Sulfate	EPA 300.0	1500		mg/L	100	100	6/29/2013
Nitrate Nitrogen	EPA 300.0	ND		mg/L	10	1.0	6/27/2013
Nitrite Nitrogen	EPA 300.0	ND		mg/L	10	0.25	6/27/2013
Trace Metals by ICP-OES							
Aluminum	EPA 200.7	ND		mg/L	1	0.045	7/8/2013
Barium	EPA 200.7	0.058		mg/L	1	0.010	7/8/2013
Beryllium	EPA 200.7	ND		mg/L	1	0.0010	7/8/2013
Bismuth	EPA 200.7	ND		mg/L	1	0.10	7/8/2013
Boron	EPA 200.7	0.61		mg/L	1	0.10	7/8/2013
Cadmium	EPA 200.7	ND		mg/L	1	0.0010	7/8/2013
Calcium	EPA 200.7	550	SC	mg/L	1	0.50	7/8/2013
Chromium	EPA 200.7	ND		mg/L	1	0.0050	7/8/2013
Cobalt	EPA 200.7	ND		mg/L	1	0.010	7/8/2013
Copper	EPA 200.7	ND		mg/L	1	0.050	7/8/2013
Gallium	EPA 200.7	ND		mg/L	1	0.10	7/8/2013
Iron	EPA 200.7	ND		mg/L	1	0.010	7/8/2013
Lithium	EPA 200.7	ND		mg/L	1	0.10	7/8/2013
Magnesium	EPA 200.7	34		mg/L	1	0.50	7/8/2013
Manganese	EPA 200.7	ND		mg/L	1	0.0050	7/8/2013
Molybdenum	EPA 200.7	0.18		mg/L	1	0.010	7/8/2013
Nickel	EPA 200.7	ND		mg/L	1	0.010	7/8/2013
Phosphorus	EPA 200.7	ND		mg/L	1	0.50	7/8/2013

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EPA Lab ID: NV00926

3230 Polaris Ave #4
Las Vegas, NV 89102 (702) 475-8899
EPA Lab ID: NV00932

Customer Sample ID: Cont. Acid 1 MWMP **Collect Date/Time:** 6/26/2013 09:00

WETLAB Sample ID: 1306619-001 **Receive Date:** 6/26/2013 15:30

Analyte	Method	Results	Units	DF	RL	Analyzed
Potassium	EPA 200.7	18	mg/L	1	0.50	7/8/2013
Scandium	EPA 200.7	ND	mg/L	1	0.100	7/8/2013
Silver	EPA 200.7	ND	mg/L	1	0.0050	7/8/2013
Sodium	EPA 200.7	8.1	mg/L	1	0.50	7/8/2013
Strontium	EPA 200.7	1.5	mg/L	1	0.10	7/8/2013
Tin	EPA 200.7	ND	mg/L	1	0.10	7/8/2013
Titanium	EPA 200.7	ND	mg/L	1	0.10	7/8/2013
Vanadium	EPA 200.7	0.034	mg/L	1	0.010	7/8/2013
Zinc	EPA 200.7	ND	mg/L	1	0.010	7/8/2013
Trace Metals by ICP-MS						
Mercury	EPA 200.8	0.00015	mg/L	1	0.00010	7/10/2013
Antimony	EPA 200.8	0.019	mg/L	1	0.0025	7/10/2013
Arsenic	EPA 200.8	0.022 M	mg/L	1	0.0050	7/10/2013
Lead	EPA 200.8	ND	mg/L	1	0.0025	7/10/2013
Selenium	EPA 200.8	ND	mg/L	1	0.0050	7/10/2013
Thallium	EPA 200.8	ND	mg/L	1	0.0010	7/10/2013
Ion Balance						
Anions	Calculation	31.9	meq/L	1	0.10	
Cations	Calculation	31.1	meq/L	1	0.10	
Error	Calculation	1.4	%	1	1.0	
Sample Preparation						
Trace Metals Digestion	EPA 200.2	Complete		1		7/5/2013

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Western Environmental Testing Laboratory
QC Report

QCBatchID	QCType	Parameter	Method	Result	Units
QC13061201	Blank 1	Fluoride	EPA 300.0	ND	mg/L
QC13061201	Blank 2	Fluoride	EPA 300.0	ND	mg/L
QC13061202	Blank 1	Chloride	EPA 300.0	ND	mg/L
QC13061202	Blank 2	Chloride	EPA 300.0	ND	mg/L
QC13061202	Blank 3	Chloride	EPA 300.0	ND	mg/L
QC13061205	Blank 1	Nitrite Nitrogen	EPA 300.0	ND	mg/L
QC13061205	Blank 2	Nitrite Nitrogen	EPA 300.0	ND	mg/L
QC13061205	Blank 3	Nitrite Nitrogen	EPA 300.0	ND	mg/L
QC13061206	Blank 1	Nitrate Nitrogen	EPA 300.0	ND	mg/L
QC13061206	Blank 2	Nitrate Nitrogen	EPA 300.0	ND	mg/L
QC13061206	Blank 3	Nitrate Nitrogen	EPA 300.0	ND	mg/L
QC13070050	Blank 1	Sulfate	EPA 300.0	ND	mg/L
QC13070050	Blank 2	Sulfate	EPA 300.0	ND	mg/L
QC13070278	Blank 1	Mercury	EPA 200.8	ND	mg/L
		Antimony	EPA 200.8	ND	mg/L
		Arsenic	EPA 200.8	ND	mg/L
		Lead	EPA 200.8	ND	mg/L
		Selenium	EPA 200.8	ND	mg/L
		Thallium	EPA 200.8	ND	mg/L
QC13070297	Blank 1	Total Dissolved Solids (TDS)	SM 2540C	ND	mg/L
QC13070297	Blank 2	Total Dissolved Solids (TDS)	SM 2540C	ND	mg/L
QC13070297	Blank 3	Total Dissolved Solids (TDS)	SM 2540C	ND	mg/L
QC13070297	Blank 4	Total Dissolved Solids (TDS)	SM 2540C	ND	mg/L
QC13070308	Blank 1	Aluminum	EPA 200.7	ND	mg/L
		Barium	EPA 200.7	ND	mg/L
		Beryllium	EPA 200.7	ND	mg/L
		Bismuth	EPA 200.7	ND	mg/L
		Boron	EPA 200.7	ND	mg/L
		Cadmium	EPA 200.7	ND	mg/L
		Calcium	EPA 200.7	ND	mg/L
		Chromium	EPA 200.7	ND	mg/L
		Cobalt	EPA 200.7	ND	mg/L
		Copper	EPA 200.7	ND	mg/L
		Gallium	EPA 200.7	ND	mg/L
		Iron	EPA 200.7	ND	mg/L
		Lithium	EPA 200.7	ND	mg/L
		Magnesium	EPA 200.7	ND	mg/L
		Manganese	EPA 200.7	ND	mg/L
		Molybdenum	EPA 200.7	ND	mg/L
		Nickel	EPA 200.7	ND	mg/L
		Phosphorus	EPA 200.7	ND	mg/L
		Potassium	EPA 200.7	ND	mg/L
		Scandium	EPA 200.7	ND	mg/L
		Silver	EPA 200.7	ND	mg/L
		Sodium	EPA 200.7	ND	mg/L
		Strontium	EPA 200.7	ND	mg/L

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QCBatchID	QCType	Parameter	Method	Result	Units
		Tin	EPA 200.7	ND	mg/L
		Titanium	EPA 200.7	ND	mg/L
		Vanadium	EPA 200.7	ND	mg/L
		Zinc	EPA 200.7	ND	mg/L

QCBatchID	QCType	Parameter	Method	Result	Actual	% Recovery	Units
QC13061119	LCS 1	pH	SM 4500-H+ B	6.99	7.00	100	pH Units
QC13061119	LCS 2	pH	SM 4500-H+ B	7.00	7.00	100	pH Units
QC13061119	LCS 3	pH	SM 4500-H+ B	7.00	7.00	100	pH Units
QC13061119	LCS 4	pH	SM 4500-H+ B	7.01	7.00	100	pH Units
QC13061119	LCS 5	pH	SM 4500-H+ B	7.01	7.00	100	pH Units
QC13061119	LCS 6	pH	SM 4500-H+ B	6.99	7.00	100	pH Units
QC13061119	LCS 7	pH	SM 4500-H+ B	7.00	7.00	100	pH Units
QC13061155	LCS 1	Total Alkalinity	SM 2320B	98.6	100	99	mg/L
QC13061155	LCS 2	Total Alkalinity	SM 2320B	97.8	100	98	mg/L
QC13061155	LCS 3	Total Alkalinity	SM 2320B	98.1	100	98	mg/L
QC13061155	LCS 4	Total Alkalinity	SM 2320B	99.0	100	99	mg/L
QC13061155	LCS 5	Total Alkalinity	SM 2320B	99.1	100	99	mg/L
QC13061155	LCS 6	Total Alkalinity	SM 2320B	99.0	100	99	mg/L
QC13061155	LCS 7	Total Alkalinity	SM 2320B	98.6	100	99	mg/L
QC13061155	LCS 8	Total Alkalinity	SM 2320B	98.7	100	99	mg/L
QC13061155	LCS 9	Total Alkalinity	SM 2320B	97.1	100	97	mg/L
QC13061201	LCS 1	Fluoride	EPA 300.0	1.97	2.00	99	mg/L
QC13061202	LCS 1	Chloride	EPA 300.0	10.3	10.0	103	mg/L
QC13061205	LCS 1	Nitrite Nitrogen	EPA 300.0	0.483	0.500	97	mg/L
QC13061206	LCS 1	Nitrate Nitrogen	EPA 300.0	2.05	2.00	102	mg/L
QC13070050	LCS 1	Sulfate	EPA 300.0	25.7	25.0	103	mg/L
QC13070278	LCS 1	Mercury	EPA 200.8	0.000878	0.001	88	mg/L
		Antimony	EPA 200.8	0.0098	0.010	98	mg/L
		Arsenic	EPA 200.8	0.0501	0.050	100	mg/L
		Lead	EPA 200.8	0.0104	0.010	104	mg/L
		Selenium	EPA 200.8	0.0477	0.050	95	mg/L
		Thallium	EPA 200.8	0.0105	0.010	105	mg/L
QC13070297	LCS 1	Total Dissolved Solids (TDS)	SM 2540C	143	150	95	mg/L
QC13070297	LCS 2	Total Dissolved Solids (TDS)	SM 2540C	139	150	92	mg/L
QC13070297	LCS 3	Total Dissolved Solids (TDS)	SM 2540C	136	150	91	mg/L
QC13070297	LCS 4	Total Dissolved Solids (TDS)	SM 2540C	147	150	98	mg/L
QC13070308	LCS 1	Aluminum	EPA 200.7	1.07	1.00	107	mg/L
		Barium	EPA 200.7	0.993	1.00	99	mg/L
		Beryllium	EPA 200.7	0.973	1.00	97	mg/L
		Bismuth	EPA 200.7	1.06	1.00	106	mg/L
		Boron	EPA 200.7	0.949	1.00	95	mg/L
		Cadmium	EPA 200.7	1.02	1.00	102	mg/L
		Calcium	EPA 200.7	9.76	10.0	98	mg/L
		Chromium	EPA 200.7	0.972	1.00	97	mg/L
		Cobalt	EPA 200.7	0.987	1.00	99	mg/L
		Copper	EPA 200.7	4.77	5.00	95	mg/L
		Gallium	EPA 200.7	1.06	1.00	106	mg/L
		Iron	EPA 200.7	0.962	1.00	96	mg/L
		Lithium	EPA 200.7	0.964	1.00	96	mg/L
		Magnesium	EPA 200.7	9.01	10.0	90	mg/L
		Manganese	EPA 200.7	0.992	1.00	99	mg/L
		Molybdenum	EPA 200.7	0.959	1.00	96	mg/L

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QCBatchID	QCType	Parameter	Method	Result	Actual	% Recovery	Units
		Nickel	EPA 200.7	4.89	5.00	98	mg/L
		Phosphorus	EPA 200.7	5.25	5.00	105	mg/L
		Potassium	EPA 200.7	9.75	10.0	98	mg/L
		Scandium	EPA 200.7	0.962	1.00	96	mg/L
		Silver	EPA 200.7	0.087	0.090	97	mg/L
		Sodium	EPA 200.7	9.02	10.0	90	mg/L
		Strontium	EPA 200.7	0.970	1.00	97	mg/L
		Tin	EPA 200.7	1.04	1.00	104	mg/L
		Titanium	EPA 200.7	0.985	1.00	98	mg/L
		Vanadium	EPA 200.7	0.960	1.00	96	mg/L
		Zinc	EPA 200.7	1.04	1.00	104	mg/L

QCBatchID	QCType	Parameter	Method	Duplicate Sample	Sample Result	Duplicate Result		Units	RPD
QC13061119	Duplicate	pH	SM 4500-H+ B	1306600-001	7.63	7.64	HT	pH Units	<1%
QC13061119	Duplicate	pH	SM 4500-H+ B	1306605-001	6.77	6.73	HT	pH Units	1 %
QC13061119	Duplicate	pH	SM 4500-H+ B	1306605-002	7.90	7.89	HT	pH Units	<1%
QC13061119	Duplicate	pH	SM 4500-H+ B	1306605-003	7.68	7.64	HT	pH Units	1 %
QC13061119	Duplicate	pH	SM 4500-H+ B	1306605-004	7.47	7.48	HT	pH Units	<1%
QC13061119	Duplicate	pH	SM 4500-H+ B	1306605-005	7.81	7.82	HT	pH Units	<1%
QC13061119	Duplicate	pH	SM 4500-H+ B	1306610-001	7.95	7.96	HT	pH Units	<1%
QC13061119	Duplicate	pH	SM 4500-H+ B	1306611-001	7.79	7.75	HT	pH Units	1 %
QC13061119	Duplicate	pH	SM 4500-H+ B	1306619-001	7.37	7.44	HT	pH Units	1 %
QC13061119	Duplicate	pH	SM 4500-H+ B	1306623-001	6.99	6.65	HT,Q	pH Units	5 %
QC13061119	Duplicate	pH	SM 4500-H+ B	1306623-002	7.75	7.81	HT	pH Units	1 %
QC13061119	Duplicate	pH	SM 4500-H+ B	1306623-003	7.13	6.98	HT,Q	pH Units	2 %
QC13061119	Duplicate	pH	SM 4500-H+ B	1306623-004	2.67	2.68	HT	pH Units	<1%
QC13061155	Duplicate	Bicarbonate (HCO3)	SM 2320B	1306600-001	168	168		mg/L	<1%
		Carbonate (CO3)	SM 2320B	1306600-001	ND	ND		mg/L	<1%
		Hydroxide (OH)	SM 2320B	1306600-001	ND	ND		mg/L	<1%
		Total Alkalinity	SM 2320B	1306600-001	138	138		mg/L as CaCO3	<1%
QC13061155	Duplicate	Bicarbonate (HCO3)	SM 2320B	1306605-001	73.9	72.8		mg/L	2 %
		Carbonate (CO3)	SM 2320B	1306605-001	ND	ND		mg/L	<1%
		Hydroxide (OH)	SM 2320B	1306605-001	ND	ND		mg/L	<1%
		Total Alkalinity	SM 2320B	1306605-001	60.6	59.7		mg/L as CaCO3	2 %
QC13061155	Duplicate	Bicarbonate (HCO3)	SM 2320B	1306605-002	476	477		mg/L	<1%
		Carbonate (CO3)	SM 2320B	1306605-002	ND	ND		mg/L	<1%
		Hydroxide (OH)	SM 2320B	1306605-002	ND	ND		mg/L	<1%
		Total Alkalinity	SM 2320B	1306605-002	391	391		mg/L as CaCO3	<1%
QC13061155	Duplicate	Bicarbonate (HCO3)	SM 2320B	1306605-003	155	154		mg/L	1 %
		Carbonate (CO3)	SM 2320B	1306605-003	ND	ND		mg/L	<1%
		Hydroxide (OH)	SM 2320B	1306605-003	ND	ND		mg/L	<1%
		Total Alkalinity	SM 2320B	1306605-003	127	126		mg/L as CaCO3	1 %
QC13061155	Duplicate	Bicarbonate (HCO3)	SM 2320B	1306605-004	203	203		mg/L	<1%
		Carbonate (CO3)	SM 2320B	1306605-004	ND	ND		mg/L	<1%

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QCBatchID	QCType	Parameter	Method	Duplicate Sample	Sample Result	Duplicate Result		Units	RPD
		Hydroxide (OH)	SM 2320B	1306605-004	ND	ND		mg/L	<1%
		Total Alkalinity	SM 2320B	1306605-004	166	167		mg/L as CaCO3	<1%
QC13061155	Duplicate	Bicarbonate (HCO3)	SM 2320B	1306605-005	131	130		mg/L	1 %
		Carbonate (CO3)	SM 2320B	1306605-005	ND	ND		mg/L	<1%
		Hydroxide (OH)	SM 2320B	1306605-005	ND	ND		mg/L	<1%
		Total Alkalinity	SM 2320B	1306605-005	107	106		mg/L as CaCO3	1 %
QC13061155	Duplicate	Bicarbonate (HCO3)	SM 2320B	1306610-001	127	127		mg/L	<1%
		Carbonate (CO3)	SM 2320B	1306610-001	ND	ND		mg/L	<1%
		Hydroxide (OH)	SM 2320B	1306610-001	ND	ND		mg/L	<1%
		Total Alkalinity	SM 2320B	1306610-001	104	104		mg/L as CaCO3	<1%
QC13061155	Duplicate	Bicarbonate (HCO3)	SM 2320B	1306611-001	136	135		mg/L	1 %
		Carbonate (CO3)	SM 2320B	1306611-001	ND	ND		mg/L	<1%
		Hydroxide (OH)	SM 2320B	1306611-001	ND	ND		mg/L	<1%
		Total Alkalinity	SM 2320B	1306611-001	111	110		mg/L as CaCO3	1 %
QC13061155	Duplicate	Bicarbonate (HCO3)	SM 2320B	1306619-001	37.5	37.7		mg/L	<1%
		Carbonate (CO3)	SM 2320B	1306619-001	ND	ND		mg/L	<1%
		Hydroxide (OH)	SM 2320B	1306619-001	ND	ND		mg/L	<1%
		Total Alkalinity	SM 2320B	1306619-001	30.8	30.9		mg/L as CaCO3	<1%
QC13061155	Duplicate	Bicarbonate (HCO3)	SM 2320B	1306623-001	6.33	4.51	Q	mg/L	34 %
		Carbonate (CO3)	SM 2320B	1306623-001	ND	ND		mg/L	<1%
		Hydroxide (OH)	SM 2320B	1306623-001	ND	ND		mg/L	<1%
		Total Alkalinity	SM 2320B	1306623-001	5.19	3.70	Q	mg/L as CaCO3	34 %
QC13061155	Duplicate	Bicarbonate (HCO3)	SM 2320B	1306623-002	63.7	63.5		mg/L	<1%
		Carbonate (CO3)	SM 2320B	1306623-002	ND	ND		mg/L	<1%
		Hydroxide (OH)	SM 2320B	1306623-002	ND	ND		mg/L	<1%
		Total Alkalinity	SM 2320B	1306623-002	52.2	52.1		mg/L as CaCO3	<1%
QC13061155	Duplicate	Bicarbonate (HCO3)	SM 2320B	1306623-003	11.1	9.24		mg/L	18 %
		Carbonate (CO3)	SM 2320B	1306623-003	ND	ND		mg/L	<1%
		Hydroxide (OH)	SM 2320B	1306623-003	ND	ND		mg/L	<1%
		Total Alkalinity	SM 2320B	1306623-003	9.08	7.58		mg/L as CaCO3	18 %
QC13070297	Duplicate	Total Dissolved Solids (TDS)	SM 2540C	1306610-001	230	228		mg/L	1 %
QC13070297	Duplicate	Total Dissolved Solids (TDS)	SM 2540C	1306647-002	609	619		mg/L	2 %
QC13070297	Duplicate	Total Dissolved Solids (TDS)	SM 2540C	1306656-001	137	152	Q	mg/L	10 %
QC13070297	Duplicate	Total Dissolved Solids (TDS)	SM 2540C	1306671-001	49.0	44.0		mg/L	11 %
QC13070297	Duplicate	Total Dissolved Solids (TDS)	SM 2540C	1306671-003	32.0	33.0		mg/L	3 %
QC13070297	Duplicate	Total Dissolved Solids (TDS)	SM 2540C	1306715-002	1027	1010		mg/L	2 %
QC13070297	Duplicate	Total Dissolved Solids (TDS)	SM 2540C	1307007-003	274	278		mg/L	1 %
QC13070297	Duplicate	Total Dissolved Solids (TDS)	SM 2540C	1307007-004	302	305		mg/L	1 %

QCBatchID	QCType	Parameter	Method	Spike Sample	Sample Result	MS Result	MSD Result	Spike Value	Units	MS % Rec.	MSD % Rec.	RPD
QC13061201	MS 1	Fluoride	EPA 300.0	1306623-001	ND	1.85	1.89	2.00	mg/L	91	93	2 %

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QCBatchID	QCType	Parameter	Method	Spike Sample	Sample Result		MS Result	MSD Result	Spike Value	Units	MS % Rec.	MSD % Rec.	RPD
QC13061202	MS 1	Chloride	EPA 300.0	1306623-001	ND		5.26	5.39	5.00	mg/L	104	106	2 %
QC13061202	MS 2	Chloride	EPA 300.0	1306541-002	ND		5.33	5.39	5.00	mg/L	106	107	1 %
QC13061205	MS 1	Nitrite Nitrogen	EPA 300.0	1306623-001	ND		0.509	0.524	0.500	mg/L	100	103	3 %
QC13061205	MS 2	Nitrite Nitrogen	EPA 300.0	1306623-003	ND		0.509	0.522	0.500	mg/L	100	102	3 %
QC13061206	MS 1	Nitrate Nitrogen	EPA 300.0	1306623-001	ND		2.25	2.30	2.00	mg/L	109	111	2 %
QC13061206	MS 2	Nitrate Nitrogen	EPA 300.0	1306623-003	ND		2.28	2.34	2.00	mg/L	110	113	3 %
QC13070050	MS 1	Sulfate	EPA 300.0	1306649-006	27.6		38.8	38.9	10.0	mg/L	111	113	<1%
QC13070278	MS 1	Mercury	EPA 200.8	1306619-001	0.000147		0.000983	0.001018	0.001	mg/L	84	87	3 %
		Antimony	EPA 200.8	1306619-001	0.0187		0.0291	0.0287	0.010	mg/L	104	100	1 %
		Arsenic	EPA 200.8	1306619-001	0.0223	M	0.0896	0.0900	0.050	mg/L	NC	NC	NC
		Lead	EPA 200.8	1306619-001	ND		0.0103	0.0104	0.010	mg/L	100	102	1 %
		Selenium	EPA 200.8	1306619-001	ND		0.0572	0.0555	0.050	mg/L	107	104	3 %
		Thallium	EPA 200.8	1306619-001	ND		0.0106	0.0108	0.010	mg/L	102	103	2 %
QC13070308	MS 1	Aluminum	EPA 200.7	1306619-001	ND		0.923	0.933	1.00	mg/L	90	91	1 %
		Barium	EPA 200.7	1306619-001	0.058		0.884	0.942	1.00	mg/L	83	88	6 %
		Beryllium	EPA 200.7	1306619-001	ND		0.955	0.951	1.00	mg/L	96	95	<1%
		Bismuth	EPA 200.7	1306619-001	ND		0.978	0.991	1.00	mg/L	105	106	1 %
		Boron	EPA 200.7	1306619-001	0.607		1.56	1.59	1.00	mg/L	95	98	2 %
		Cadmium	EPA 200.7	1306619-001	ND		0.990	1.06	1.00	mg/L	99	106	7 %
		Calcium	EPA 200.7	1306619-001	552	SC	488	502	10.0	mg/L	NC	NC	NC
		Chromium	EPA 200.7	1306619-001	ND		0.909	0.902	1.00	mg/L	91	90	1 %
		Cobalt	EPA 200.7	1306619-001	ND		0.942	0.935	1.00	mg/L	94	93	1 %
		Copper	EPA 200.7	1306619-001	ND		5.26	5.31	5.00	mg/L	105	106	1 %
		Gallium	EPA 200.7	1306619-001	ND		0.993	1.07	1.00	mg/L	99	106	7 %
		Iron	EPA 200.7	1306619-001	ND		0.858	0.855	1.00	mg/L	86	86	<1%
		Lithium	EPA 200.7	1306619-001	ND		0.995	1.01	1.00	mg/L	100	101	1 %
		Magnesium	EPA 200.7	1306619-001	34.1		42.0	39.1	10.0	mg/L	79	50	7 %
		Manganese	EPA 200.7	1306619-001	ND		0.788	0.770	1.00	mg/L	97	95	2 %
		Molybdenum	EPA 200.7	1306619-001	0.176		1.18	1.16	1.00	mg/L	100	98	2 %
		Nickel	EPA 200.7	1306619-001	ND		4.70	4.86	5.00	mg/L	94	97	3 %
		Phosphorus	EPA 200.7	1306619-001	ND		5.84	6.82	5.00	mg/L	114	134	15 %
		Potassium	EPA 200.7	1306619-001	18.1		27.2	27.4	10.0	mg/L	91	93	1 %
		Scandium	EPA 200.7	1306619-001	ND		0.927	0.893	1.00	mg/L	93	89	4 %
		Silver	EPA 200.7	1306619-001	ND		0.084	0.087	0.090	mg/L	96	99	4 %
		Sodium	EPA 200.7	1306619-001	8.13		17.7	17.8	10.0	mg/L	96	97	1 %
		Strontium	EPA 200.7	1306619-001	1.50		2.26	2.27	1.00	mg/L	76	77	<1%
		Tin	EPA 200.7	1306619-001	ND		0.970	1.03	1.00	mg/L	104	110	6 %
		Titanium	EPA 200.7	1306619-001	ND		0.896	0.890	1.00	mg/L	90	90	1 %
		Vanadium	EPA 200.7	1306619-001	0.034		0.987	0.978	1.00	mg/L	95	94	1 %
		Zinc	EPA 200.7	1306619-001	ND		1.04	1.14	1.00	mg/L	104	114	9 %

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EPA Lab ID: NV00926

3230 Polaris Ave #4
Las Vegas, NV 89102 (702) 475-8899
EPA Lab ID: NV00932

WETLAB
WESTERN ENVIRONMENTAL TESTING LABORATORY
Specializing in Soil, Hazardous Waste and Water Analysis.
475 E. Greg Street #119 | Sparks, Nevada 89431
tel (775) 355-0202 | fax (775) 355-0817 | www.WETLaboratory.com

Lab Number 1306619
Report Due Date: 7/11/13
Page 1 of 1

Client: McClelland Laboratories, Inc.
Address: 1016 Greg Street
City, State & Zip: Sparks, NV 89431
Contact: Mike Medina
Phone: 775-356-1300 | Collector's Name: Robert
Fax: 775-356-8917 | Project Name:
P.O. Number: | Project Number: 3800
Email: mli@mettest.com

Turnaround Time: Standard

Billing Address (if different than Client Address):
Company
Address
City, State & Zip
Contact
Phone
Fax
Email

Additional Information

Fax Results	Y	N	To: Client	Billing
Email Results	Y	N	To: Client	Billing
Compliance Monitoring	Y	N		
Fax Results to State EPA	Y	N		

Sample Type Codes:
DW = Drinking Water; SD = Solid
WW = Wastewater; SO = Soil
SW = Surface Water; HW = Hazardous Waste
MW = Monitoring Well; OTHER:

SAMPLE ID/LOCATION	DATE	TIME	MATRIX	# CONTAINERS	Profile II w/o WAD	Spl. No.
Cont. Acid 1 MWMP	06/26/13	9:00am	WW	2	X	1

1306 5
619 1

Instructions/Comments/Special Requirements:

SAMPLE RECEIPT	DATE	TIME	Sample Received by:	Sample Released by:
Temperature 21 °C	6/26/13	1530		
Custody Seals Intact? Y N None				
Number of Containers 2				

WETLAB's Standard Terms and Conditions apply unless separate agreements signed or otherwise. Payment terms are Net 30 days.

To the maximum extent permitted by law, the Client agrees to limit the liability of WETLAB for the Client's damages to the total compensation received, unless other agreements are made in writing. This limitation shall apply regardless of the cause of action or legal theory pled or asserted.

301.2E

WETLAB WESTERN ENVIRONMENTAL TESTING LABORATORY *Specializing in Soil, Hazardous Waste and Water Analysis.*

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Lab Number 1306619
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Page 1 of 1

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P.O. Number: | Project Number: 3800
Email: mli@mettest.com

Turnaround Time

Billing Address (if different than Client Address):
Company
Address
City, State & Zip
Contact
Phone
Fax
Email

Additional Information

Fax Results Y N To: Client Billing
Email Results Y N To: Client Billing
Compliance Monitoring Y N
Fax Results to State EPA Y N

Sample Type Codes

DW = Drinking Water SD = Solid
WW = Wastewater SO = Soil
SW = Surface Water HW = Hazardous Waste
MW = Monitoring Well OTHER:

Analyses Requested

SAMPLE ID/LOCATION	DATE	TIME	Sample Type	No. of Containers	Profile II w/o WAD										Spl. No.
Cont. Acid 1 MWMP	06/26/13	9:00am	WW	2	X										1

1306 5
619 1

Instructions/Comments/Special Requirements:

SAMPLE RECEIPT	DATE	TIME	Samples Relinquished By	Samples Received By
Temperature 21 °C	6/26/13	1530	[signature]	[signature]
Custody Seals Intact? Y N None				
Number of Containers 2				

301.2E

7/2/2013

McClelland Laboratory
1016 Greg Street
Sparks, NV 89431
Attn: Mike Medina

OrderID: *1306309*

Dear: Mike Medina

This is to transmit the attached analytical report. The analytical data and information contained therein was generated using specified or selected methods contained in references, such as Standard Methods for the Examination of Water and Wastewater, 18th & 19th editions, Methods for Determination of Organic Compounds in Drinking Water, EPA-600/4-79-020, and Test Methods for Evaluation of Solid Waste, Physical/Chemical Methods (SW846) Third Edition.

The samples were received by WETLAB-Western Environmental Testing Laboratory in good condition on 6/13/2013. Additional comments are located on page 2 of this report.

If you should have any questions or comments regarding this report, please do not hesitate to call.

Sincerely,

Jennifer Delaney
QA Specialist

SPARKS
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fax (775) 777-9933

LAS VEGAS
3230 Polaris Ave., Suite 4
Las Vegas, Nevada 89102
tel (702) 475-8899
fax (702) 776-6152

Western Environmental Testing Laboratory
Report Comments

McClelland Laboratory - 1306309

General Comments

None

Specific Comments

The analysis of the laboratory SPLP Blank revealed concentrations of Sodium, SPLP above the reporting limit during the analysis of sample 1306309-001 . We apologize for any inconvenience this may have caused.

Due to the sample matrix it was necessary to analyze the following at a dilution:
1306309-001 Fluoride
The reporting limits have been adjusted accordingly.

Report Legend

B -- Blank contamination; Analyte detected above the method reporting limit in an associated blank

D -- Reporting limit is elevated due to required sample dilution

DF -- Dilution Factor

HT -- Sample analyzed beyond the accepted holding time

J -- The reported value is between the laboratory method detection limit and the laboratory practical quantitation limit

M -- Reported value is estimated; The sample matrix interfered with the analysis

MCL -- State or EPA Maximum Contamination Level

N -- There was insufficient sample available to perform a spike and/or duplicate on this analytical batch.

NC -- Not calculated due to matrix interference

ND -- Non-detect result; Indicates the result was below the reporting limit (RL)

Q -- Reported value is estimated; The value failed to meet QC criteria for either precision or accuracy

RL -- Reporting Limit or Practical Quantitation Limit

S -- Surrogate recovery was outside of laboratory acceptance limits due to matrix interference. The associated blank and LCS surrogate recovery was within acceptance limits

SC -- Spike recovery not calculated. Sample concentration >4X the spike amount; therefore, the spike could not be adequately recovered

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Las Vegas, NV 89102 (702) 475-8899
EPA Lab ID: NV00932

Western Environmental Testing Laboratory
Analytical Report

McClelland Laboratory
1016 Greg Street
Sparks, NV 89431
Attn: Mike Medina
Phone: (775) 356-1300 **Fax:** (775) 356-8917
PO\Project: *3800*

Date Printed: 7/2/2013
OrderID: *1306309*

Customer Sample ID: CS Mining Enviro Sample
WETLAB Sample ID: 1306309-001

Collect Date/Time: 6/13/2013 09:00
Receive Date: 6/13/2013 16:40

Analyte	Method	Results		Units	DF	RL	Analyzed
Anions by Ion Chromatography							
Fluoride	EPA 300.0	ND		mg/kg	15	1.5	6/17/2013
Sulfate	EPA 300.0	4000		mg/kg	150	150	6/15/2013
Sample Preparation							
Trace Metals Digestion	EPA 3010A	Complete			1		6/24/2013
SPLP Extraction	EPA 1312	Complete			1		6/18/2013
3:1 DI Water Extraction	WL 3.0	Complete			1		6/14/2013
SPLP Metals							
Copper, SPLP	SW846 6010B	ND		mg/L	1	0.05	6/25/2013
Calcium, SPLP	SW846 6010B	580	SC	mg/L	1	0.50	6/28/2013
Sodium, SPLP	SW846 6010B	25	B	mg/L	1	0.50	6/28/2013
Antimony, SPLP	SW846 6010B	ND		mg/L	1	0.05	6/25/2013
Arsenic, SPLP	SW846 6010B	ND		mg/L	1	0.10	6/25/2013
Barium, SPLP	SW846 6010B	ND		mg/L	1	0.20	6/25/2013
Beryllium, SPLP	SW846 6010B	ND		mg/L	1	0.01	6/25/2013
Boron, SPLP	SW846 6010B	ND		mg/L	1	0.1	6/25/2013
Cadmium, SPLP	SW846 6010B	ND		mg/L	1	0.01	6/25/2013
Cobalt, SPLP	SW846 6010B	ND		mg/L	1	0.01	6/25/2013
Gallium, SPLP	SW846 6010B	ND		mg/L	1	0.5	6/25/2013
Iron, SPLP	SW846 6010B	ND		mg/L	1	0.1	6/25/2013
Lead, SPLP	SW846 6010B	ND		mg/L	1	0.10	6/25/2013
Magnesium, SPLP	SW846 6010B	3.5		mg/L	1	0.5	6/25/2013
Manganese, SPLP	SW846 6010B	ND		mg/L	1	0.05	6/25/2013
Molybdenum, SPLP	SW846 6010B	0.03		mg/L	1	0.01	6/25/2013
Nickel, SPLP	SW846 6010B	0.01		mg/L	1	0.01	6/25/2013
Selenium, SPLP	SW846 6010B	ND		mg/L	1	0.04	6/25/2013
Silver, SPLP	SW846 6010B	ND		mg/L	1	0.05	6/25/2013
Strontium, SPLP	SW846 6010B	0.8		mg/L	1	0.5	6/25/2013
Thallium, SPLP	SW846 6010B	ND		mg/L	1	0.05	6/25/2013
Tin, SPLP	SW846 6010B	ND		mg/L	1	0.5	6/25/2013
Zinc, SPLP	SW846 6010B	ND		mg/L	1	0.02	6/25/2013
Chromium, SPLP	SW846 6010B	ND		mg/L	1	0.05	6/25/2013
Mercury, SPLP	SW846 7470A	ND		mg/L	1	0.0001	6/20/2013

DF=Dilution Factor, RL=Reporting Limit, ND=Not Detected or <RL

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EPA Lab ID: NV00926

3230 Polaris Ave #4
Las Vegas, NV 89102 (702) 475-8899
EPA Lab ID: NV00932

Western Environmental Testing Laboratory
QC Report

QCBatchID	QCType	Parameter	Method	Result	Units
QC13060612	Blank 1	Sulfate	EPA 300.0	ND	mg/L
QC13060612	Blank 2	Sulfate	EPA 300.0	ND	mg/L
QC13060612	Blank 3	Sulfate	EPA 300.0	ND	mg/L
QC13060679	Blank 1	Fluoride	EPA 300.0	ND	mg/L
QC13060679	Blank 2	Fluoride	EPA 300.0	ND	mg/L
QC13060679	Blank 3	Fluoride	EPA 300.0	ND	mg/L
QC13060820	Blank 1	Mercury, SPLP	SW846 7470A	ND	mg/L
QC13060820	Blank 2	Mercury, SPLP	SW846 7470A	ND	mg/L
QC13060983	Blank 1	Iron, SPLP	SW846 6010B	ND	mg/L
		Selenium, SPLP	SW846 6010B	ND	mg/L
		Nickel, SPLP	SW846 6010B	ND	mg/L
		Molybdenum, SPLP	SW846 6010B	ND	mg/L
		Manganese, SPLP	SW846 6010B	ND	mg/L
		Lead, SPLP	SW846 6010B	ND	mg/L
		Thallium, SPLP	SW846 6010B	ND	mg/L
		Magnesium, SPLP	SW846 6010B	ND	mg/L
		Arsenic, SPLP	SW846 6010B	ND	mg/L
		Copper, SPLP	SW846 6010B	ND	mg/L
		Cobalt, SPLP	SW846 6010B	ND	mg/L
		Chromium, SPLP	SW846 6010B	ND	mg/L
		Cadmium, SPLP	SW846 6010B	ND	mg/L
		Boron, SPLP	SW846 6010B	ND	mg/L
		Silver, SPLP	SW846 6010B	ND	mg/L
		Barium, SPLP	SW846 6010B	ND	mg/L
		Strontium, SPLP	SW846 6010B	ND	mg/L
		Antimony, SPLP	SW846 6010B	ND	mg/L
		Zinc, SPLP	SW846 6010B	ND	mg/L
		Tin, SPLP	SW846 6010B	ND	mg/L
		Gallium, SPLP	SW846 6010B	ND	mg/L
		Beryllium, SPLP	SW846 6010B	ND	mg/L
QC13070053	Blank 1	Calcium, SPLP	SW846 6010B	ND	mg/L
QC13070054	Blank 1	Sodium, SPLP	SW846 6010B	ND	mg/L

QCBatchID	QCType	Parameter	Method	Result	Actual	% Recovery	Units
QC13060612	LCS 1	Sulfate	EPA 300.0	23.4	25.0	94	mg/L
QC13060679	LCS 1	Fluoride	EPA 300.0	1.83	2.00	91	mg/L
QC13060820	LCS 1	Mercury, SPLP	SW846 7470A	0.00483	0.005	97	mg/L
QC13060983	LCS 1	Antimony, SPLP	SW846 6010B	10.5	10.0	105	mg/L
		Arsenic, SPLP	SW846 6010B	10.4	10.0	104	mg/L
		Barium, SPLP	SW846 6010B	9.82	10.0	98	mg/L
		Beryllium, SPLP	SW846 6010B	10.3	10.0	103	mg/L
		Boron, SPLP	SW846 6010B	9.71	10.0	97	mg/L
		Cadmium, SPLP	SW846 6010B	9.76	10.0	98	mg/L
		Chromium, SPLP	SW846 6010B	9.79	10.0	98	mg/L
		Cobalt, SPLP	SW846 6010B	9.86	10.0	99	mg/L
		Copper, SPLP	SW846 6010B	49.9	50.0	100	mg/L

DF=Dilution Factor, RL=Reporting Limit, ND=Not Detected or <RL

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QCBatchID	QCType	Parameter	Method	Result	Actual	% Recovery	Units
		Zinc, SPLP	SW846 6010B	10.2	10.0	102	mg/L
		Tin, SPLP	SW846 6010B	10.0	10.0	100	mg/L
		Strontium, SPLP	SW846 6010B	9.90	10.0	99	mg/L
		Thallium, SPLP	SW846 6010B	9.57	10.0	96	mg/L
		Iron, SPLP	SW846 6010B	9.52	10.0	95	mg/L
		Lead, SPLP	SW846 6010B	9.93	10.0	99	mg/L
		Magnesium, SPLP	SW846 6010B	95.2	100	95	mg/L
		Manganese, SPLP	SW846 6010B	9.86	10.0	99	mg/L
		Molybdenum, SPLP	SW846 6010B	9.97	10.0	100	mg/L
		Nickel, SPLP	SW846 6010B	49.0	50.0	98	mg/L
		Selenium, SPLP	SW846 6010B	48.5	50.0	97	mg/L
		Silver, SPLP	SW846 6010B	0.871	0.900	97	mg/L
		Gallium, SPLP	SW846 6010B	9.46	10.0	95	mg/L
QC13070053	LCS 1	Calcium, SPLP	SW846 6010B	10.0	10.0	100	mg/L
QC13070054	LCS 1	Sodium, SPLP	SW846 6010B	9.83	10.0	98	mg/L

QCBatchID	QCType	Parameter	Method	Spike Sample	Sample Result		MS Result	MSD Result	Spike Value	Units	MS % Rec.	MSD % Rec.	RPD
QC13060612	MS 1	Sulfate	EPA 300.0	1306291-004	592	SC	666	675	10.0	mg/L	NC	NC	NC
QC13060612	MS 2	Sulfate	EPA 300.0	1306313-001	40.9		50.4	50.8	10.0	mg/L	95	98	1 %
QC13060679	MS 1	Fluoride	EPA 300.0	1306349-001	ND		19.4	19.3	2.00	mg/L	95	94	1 %
QC13060679	MS 2	Fluoride	EPA 300.0	1306349-010	0.113		2.02	2.06	2.00	mg/L	95	98	2 %
QC13060820	MS 1	Mercury, SPLP	SW846 7470A	1306309-001	ND		0.005	0.005	0.005	mg/L	94	94	<1%
QC13060983	MS 1	Copper, SPLP	SW846 6010B	1306309-001	ND		5.76	5.74	5.00	mg/L	115	114	<1%
		Antimony, SPLP	SW846 6010B	1306309-001	ND		1.09	1.07	1.00	mg/L	108	106	2 %
		Arsenic, SPLP	SW846 6010B	1306309-001	ND		1.04	1.02	1.00	mg/L	109	107	2 %
		Barium, SPLP	SW846 6010B	1306309-001	ND		1.03	1.02	1.00	mg/L	97	96	1 %
		Beryllium, SPLP	SW846 6010B	1306309-001	ND		1.05	1.02	1.00	mg/L	105	102	3 %
		Boron, SPLP	SW846 6010B	1306309-001	ND		0.990	0.997	1.00	mg/L	103	104	1 %
		Cadmium, SPLP	SW846 6010B	1306309-001	ND		0.972	0.960	1.00	mg/L	97	96	1 %
		Cobalt, SPLP	SW846 6010B	1306309-001	ND		0.986	0.986	1.00	mg/L	98	98	<1%
		Nickel, SPLP	SW846 6010B	1306309-001	0.011		4.94	4.91	5.00	mg/L	99	98	1 %
		Tin, SPLP	SW846 6010B	1306309-001	ND		0.902	0.889	1.00	mg/L	103	101	1 %
		Thallium, SPLP	SW846 6010B	1306309-001	ND		1.07	1.04	1.00	mg/L	107	104	3 %
		Strontium, SPLP	SW846 6010B	1306309-001	0.821		1.83	1.92	1.00	mg/L	101	110	5 %
		Chromium, SPLP	SW846 6010B	1306309-001	ND		0.995	0.996	1.00	mg/L	99	99	<1%
		Selenium, SPLP	SW846 6010B	1306309-001	ND		5.30	5.18	5.00	mg/L	106	104	2 %
		Zinc, SPLP	SW846 6010B	1306309-001	ND		1.06	1.03	1.00	mg/L	106	103	3 %
		Molybdenum, SPLP	SW846 6010B	1306309-001	0.032		1.02	0.985	1.00	mg/L	99	95	3 %
		Manganese, SPLP	SW846 6010B	1306309-001	ND		0.972	0.969	1.00	mg/L	97	97	<1%
		Magnesium, SPLP	SW846 6010B	1306309-001	3.50		13.6	13.6	10.0	mg/L	101	101	<1%
		Lead, SPLP	SW846 6010B	1306309-001	ND		0.909	0.867	1.00	mg/L	98	94	5 %
		Iron, SPLP	SW846 6010B	1306309-001	ND		0.988	0.995	1.00	mg/L	98	99	1 %
		Gallium, SPLP	SW846 6010B	1306309-001	ND		1.06	1.07	1.00	mg/L	106	107	1 %
		Silver, SPLP	SW846 6010B	1306309-001	ND		0.100	0.099	0.090	mg/L	102	101	1 %
QC13070053	MS 1	Calcium, SPLP	SW846 6010B	1306309-001	585	SC	550	547	10.0	mg/L	NC	NC	NC
QC13070054	MS 1	Sodium, SPLP	SW846 6010B	1306309-001	24.7	B	33.8	32.8	10.0	mg/L	91	81	3 %

DF=Dilution Factor, RL=Reporting Limit, ND=Not Detected or <RL

475 East Greg Street Suite #119
Sparks, NV 89431 (775) 355-0202
EPA Lab ID: NV00925 - ELAP No: 25

1084 Lamoille Hwy
Elko, NV 89801 (775) 777-9933
EPA Lab ID: NV00926

3230 Polaris Ave #4
Las Vegas, NV 89102 (702) 475-8899
EPA Lab ID: NV00932

WETLAB
WESTERN ENVIRONMENTAL TESTING LABORATORY
Specializing in Soil, Hazardous Waste and Water Analysis.
475 E. Greg Street #119 | Sparks, Nevada 89431
tel (775) 355-0202 | fax (775) 355-0917 | www.WETLaboratory.com

Lab Number 1306309
Report Due Date: 6/27/13
Page 1 of 1

Client	McClelland Laboratories, Inc.
Address	1016 Greg Street
City, State & Zip	Sparks, NV 89431
Contact	Mike Medina
Phone	775-356-1300
Collector's Name	RJ
Fax	775-356-8917
Project Name	
P.O. Number	
Project Number	3800
Email	mli@mettest.com

Billing Address (if different than Client Address):
Company
Address
City, State & Zip
Contact
Phone
Fax
Email

Fax Results	Y	N	To: Client	Billing
Email Results	Y	N	To: Client	Billing
Compliance Monitoring	Y	N		
Fax Results to State EPA	Y	N		

DW = Drinking Water
WW = Wastewater
SW = Surface Water
MW = Monitoring Well
SD = Solid
SO = Soil
HW = Hazardous Waste
OTHER:

					SPLP (see attached)										Spl. No.
CS Mining Enviro Sample		0900	SD	1	X										1

1306 309 1

Instructions/Comments/Special Requirements: See attached sheet for list of SPLP extract analytes. Sample from Utah.

Temperature 21.2 °C	6/13/13	1640		
Custody Seals Intact? Y N None				
Number of Containers 1				

WETLAB
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Address	1016 Greg Street
City, State & Zip	Sparks, NV 89431
Contact	Mike Medina
Phone	775-356-1300
Collector's Name	RJ
Fax	775-356-8917
Project Name	
P.O. Number	
Project Number	3800
Email	mli@mettest.com

Billing Address (if different than Client Address):
Company
Address
City, State & Zip
Contact
Phone
Fax
Email

Fax Results	Y	N	To: Client	Billing
Email Results	Y	N	To: Client	Billing
Compliance Monitoring	Y	N		
Fax Results to State EPA	Y	N		

DW = Drinking Water
WW = Wastewater
SW = Surface Water
MW = Monitoring Well
SD = Solid
SO = Soil
HW = Hazardous Waste
OTHER:

					SPLP (see attached)											Spl. No.
CS Mining Enviro Sample		0900	SD	1	X											1

1306 309 1

Instructions/Comments/Special Requirements: See attached sheet for list of SPLP extract analytes. Sample from Utah.

Temperature 21.2 °C	6/13/13	1640		
Custody Seals Intact? Y N (None)				
Number of Containers 1				

To the maximum extent permitted by law, the Client agrees to limit the liability of WETLAB for the Client's damages to the total compensation received, unless other agreements are made in writing. This limitation shall apply regardless of the cause of action or legal theory pled or asserted.

301.2E

e Government Gulch - PO Box 929 Kellogg ID 83837-0929 (208) 784-1258 Fax (208) 783-0891

McClelland Laboratories Inc
1016 Greg Street
Sparks, NV 89431

Project Name: MLI: 3800
Work Order: **W3F0234**
Reported: 25-Jun-13 13:10

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Sampled By	Date Received
3800 CONT ACID 1	W3F0234-01	Soil	07-Jun-13 09:00	TJ	11-Jun-2013

Solid samples are analyzed on an as-received, wet-weight basis, unless otherwise requested. Non-Detects are reported at the MDL.
Sample preparation is defined by the client as per their Data Quality Objectives.
This report supercedes any previous reports for this Work Order. The complete report includes pages for each sample, a full QC report, and a notes section.
The results presented in this report relate only to the samples, and meet all requirements of the NELAC Standards unless otherwise noted.

e Government Gulch - PO Box 929 Kellogg ID 83837-0929 (208) 784-1258 Fax (208) 783-0891

McClelland Laboratories Inc
1016 Greg Street
Sparks, NV 89431

Project Name: MLI: 3800
Work Order: **W3F0234**
Reported: 25-Jun-13 13:10

Client Sample ID: **3800 CONT ACID 1**
SVL Sample ID: **W3F0234-01 (Soil)**

Sampled: 07-Jun-13 09:00
Received: 11-Jun-13
Sampled By: TJ

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Acid/Base Accounting & Sulfur Forms										
Modified Sobek	**ABA**	48.5	TCaCO3/kT	0.3			N/A		06/20/13 13:55	
Modified Sobek	AGP	< 0.3	TCaCO3/kT	0.3			N/A		06/20/13 11:10	
Modified Sobek	**ANP**	48.5	TCaCO3/kT	0.3	0.1		W325137	AGF	06/20/13 13:55	A5
Modified Sobek	Non-extractable Sulfur	< 0.01	%	0.01	0.006		W325137	MCE	06/20/13 11:10	
Modified Sobek	Non-Sulfate Sulfur	< 0.01	%	0.01	0.006		W325137	MCE	06/20/13 10:55	
Modified Sobek	Pyritic Sulfur	< 0.01	%	0.01			N/A		06/20/13 11:10	
Modified Sobek	**Sulfate Sulfur**	2.12	%	0.01			N/A		06/20/13 10:55	
Modified Sobek	**Total Sulfur**	2.12	%	0.01	0.006		W325137	MCE	06/19/13 11:09	
Acid/Base Accounting & Sulfur Forms (HCl Wash)										
Modified Sobek	**ABA-HCl**	48.5	TCaCO3/kT	0.3			N/A		06/20/13 13:55	
Modified Sobek	AGP-HCl	< 0.3	TCaCO3/kT	0.3			N/A		06/20/13 11:30	
Modified Sobek	Non-extractable Sulfur	< 0.01	%	0.01	0.006		W325137	MCE	06/20/13 11:10	
Modified Sobek	Non-Sulfate Sulfur-HCl	< 0.01	%	0.01	0.006		W325137	MCE	06/20/13 11:30	
Modified Sobek	Pyritic Sulfur-HCl	< 0.01	%	0.01			N/A		06/20/13 11:30	
Modified Sobek	**Sulfate Sulfur-HCl**	2.12	%	0.01			N/A		06/20/13 11:30	
Modified Sobek	**Total Sulfur**	2.12	%	0.01	0.006		W325137	MCE	06/19/13 11:09	
Classical Chemistry Parameters										
USDA HB60(21a)	**Paste pH @20.9°C**	7.75	pH Units				W325252	AGF	06/21/13 10:30	

This data has been reviewed for accuracy and has been authorized for release by the Laboratory Director or designee.

John Kern
Laboratory Director

e Government Gulch - PO Box 929 Kellogg ID 83837-0929 (208) 784-1258 Fax (208) 783-0891

McClelland Laboratories Inc
1016 Greg Street
Sparks, NV 89431

Project Name: MLI: 3800
Work Order: **W3F0234**
Reported: 25-Jun-13 13:10

Quality Control - BLANK Data

Method	Analyte	Units	Result	MDL	MRL	Batch ID	Analyzed	Notes
Acid/Base Accounting & Sulfur Forms								
Modified Sobek	ANP	TCaCO3/kT	<0.3	0.1	0.3	W325137	20-Jun-13	
Modified Sobek	Non-Sulfate Sulfur	%	<0.01	0.006	0.01	W325137	20-Jun-13	
Modified Sobek	Total Sulfur	%	<0.01	0.006	0.01	W325137	19-Jun-13	
Modified Sobek	Non-extractable Sulfur	%	<0.01	0.006	0.01	W325137	20-Jun-13	
Acid/Base Accounting & Sulfur Forms (HCl Wash)								
Modified Sobek	Non-Sulfate Sulfur-HCl	%	<0.01	0.006	0.01	W325137	20-Jun-13	
Modified Sobek	Total Sulfur	%	<0.01	0.006	0.01	W325137	19-Jun-13	
Modified Sobek	Non-extractable Sulfur	%	<0.01	0.006	0.01	W325137	20-Jun-13	

Quality Control - LABORATORY CONTROL SAMPLE Data

Method	Analyte	Units	LCS Result	LCS True	% Rec.	Acceptance Limits	Batch ID	Analyzed	Notes
id/Base Accounting & Sulfur Forms									
odified Sobek	ANP	TCaCO3/kT	212	216	98.3	80 - 120	W325137	20-Jun-13	
Modified Sobek	Total Sulfur	%	1.06	0.00		80 - 120	W325137	19-Jun-13	
Acid/Base Accounting & Sulfur Forms (HCl Wash)									
Modified Sobek	Total Sulfur	%	1.06	0.00		80 - 120	W325137	19-Jun-13	
Classical Chemistry Parameters									
USDA HB60(21a)	Paste pH	pH Units	7.40	7.40	100	93.7 - 106.3	W325252	21-Jun-13	

Quality Control - DUPLICATE Data

Method	Analyte	Units	Duplicate Result	Sample Result	RPD	RPD Limit	Batch ID	Analyzed	Notes
Acid/Base Accounting & Sulfur Forms									
Modified Sobek	ANP	TCaCO3/kT	11.0	10.0	9.5	20	W325137	20-Jun-13	
Modified Sobek	Non-Sulfate Sulfur	%	0.66	0.71	7.7	20	W325137	20-Jun-13	
Modified Sobek	Total Sulfur	%	0.98	1.01	2.6	20	W325137	19-Jun-13	
Modified Sobek	Non-extractable Sulfur	%	<0.01	<0.01	UDL	20	W325137	20-Jun-13	
Acid/Base Accounting & Sulfur Forms (HCl Wash)									
Modified Sobek	Non-Sulfate Sulfur-HCl	%	0.55	0.60	8.0	20	W325137	20-Jun-13	
Modified Sobek	Total Sulfur	%	0.98	1.01	2.6	20	W325137	19-Jun-13	
Modified Sobek	Non-extractable Sulfur	%	<0.01	<0.01	UDL	20	W325137	20-Jun-13	
Classical Chemistry Parameters									
USDA HB60(21a)	Paste pH	pH Units	7.72	7.75	0.4	20	W325252	21-Jun-13	

e Government Gulch - PO Box 929 Kellogg ID 83837-0929 (208) 784-1258 Fax (208) 783-0891

McClelland Laboratories Inc
1016 Greg Street
Sparks, NV 89431

Project Name: MLI: 3800
Work Order: **W3F0234**
Reported: 25-Jun-13 13:10

Notes and Definitions

A5	5 g of sample used in ANP analysis
LCS	Laboratory Control Sample (Blank Spike)
RPD	Relative Percent Difference
UDL	A result is less than the detection limit
R > 4S	% recovery not applicable, sample concentration more than four times greater than spike level
<RL	A result is less than the reporting limit
MRL	Method Reporting Limit
MDL	Method Detection Limit
N/A	Not Applicable

ALS Metallurgy

August 1, 2013

Mr. Mike Medina
McClelland Laboratories, Inc.
1016 Greg Street
Sparks, Nevada 89431
USA

Dear Mr. Medina;

Re: Mineralogical Assessment of a McClelland Laboratory Test Product – KM3924

We have completed mineralogical analysis on one test product sample provided by McClelland Laboratories Inc. Sample for this program arrived on June 21, 2013, which contained an acid leached tailing, designated CS Mining Enviro Sample, weighing about 0.5 kilograms.

Chemical head assays were taken and are displayed below in Table 1.

TABLE 1
HEAD ASSAY DATA

Sample	Elements for Assays – percent or g/tonne						
	Sb	As	Cu	Au	Ag	S(t)	S(s)
CS Mining Enviro Sample Head 1	<20	0.008	0.14	0.17	11	1.79	0.75

Note: Sb, Au, Ag are reported in g/tonne, all others are in percent.

A Bulk Mineral Analysis (BMA) and an XRD analysis were completed on the sample. The sample was found to mainly be non-sulphide gangue minerals with traces of sulphide

minerals. Sulphide minerals detected were pyrite at about 0.5 percent and about 0.1 percent was a mix of the copper sulphides; chalcopyrite, bornite, chalcocite and covellite.

Iron oxide minerals, primarily magnetite with some hematite comprised 22 percent of the sample. Pyroxene and amphibole made up a further 19 percent. Feldspars comprised about 14 percent of the samples. Complete mineral content data can be found in Appendix I.

Thank you for choosing ALS Metallurgy Kamloops for your testing requirements. Please contact us if you have any questions regarding this program.

Sincerely,

David Roulston, EIT
Project Metallurgist

Helen Johnston, P. Eng.
Senior Metallurgist

August 1, 2013
KM3924

Report Distribution:
Mike Medina, McClelland Laboratories Inc. – electronic copy

APPENDIX I – KM3924

MINERALOGICAL DATA

TABLE 1
SEMI-QUANTITATIVE MINERAL COMPOSITION OF CS MINING ENVIRONMENTAL SAMPLE KM3924

Minerals	CS Mining Enviro Sample
Copper Sulphides	0.1
Pyrite	0.5
Iron Oxides	22.0
Quartz	8.5
Feldspars	14.3
Amphibole/Pyroxene	19.0
Muscovite	1.1
Biotite/Phlogopite	3.3
Serpentine	8.8
Talc	2.6
Garnet	5.8
Gypsum	5.4
Apatite	0.4
Olivine	0.3
Chlorite	4.3
Carbonates	0.6
Ti Minerals	0.5
Others	2.5
Total	100

Note: 1) Copper Sulphides includes Chalcopyrite, Bornite and Chalcocite/Covellite.
2) Iron Oxides includes Magnetite, Hematite, Goethite and Limonite.
3) Feldspars includes K-Feldspar, Plagioclase Feldspar, Feldpsar Albite and Alkali Feldspar.
4) Garnet includes Andradite and Grossular.
5) Carbonates includes Calcite, Siderite and Dolomite.
6) Ti-Minerals includes Rutile/Anatase and Sphene.
7) Others includes trace amounts of Spinel and unresolved mineral species.
8) Due to the nature of Gypsum, some may have been lost during sample preparation and is therefore unaccounted for in the composition table.

TABLE 2
SEMI-QUANTITATIVE CHEMICAL COMPOSITION OF CS MINING ENVIRONMENTAL SAMPLE KM3924

Element	Assay Methods	CS Mining Enviro Sample
Al	QEMSCAN	2.94
	Chemical	2.45
Ca	QEMSCAN	6.90
	Chemical	5.40
Cu	QEMSCAN	0.07
	Chemical	0.14
Fe	QEMSCAN	19.2
	Chemical	17.5
K	QEMSCAN	1.48
	Chemical	0.97
Mg	QEMSCAN	5.38
	Chemical	4.93
Na	QEMSCAN	0.50
	Chemical	0.46
P	QEMSCAN	0.08
	Chemical	0.05
S	QEMSCAN	1.31
	Chemical	1.79
Si	QEMSCAN	17.9
	Chemical	15.7
Ti	QEMSCAN	0.12
	Chemical	0.13

Note: 1) Due to the nature of Gypsum, some may have been lost during sample preparation and therefore some Sulphur is unaccounted for in the assay table.

FIGURE 1
ASSAY RECONCILIATION
KM3924

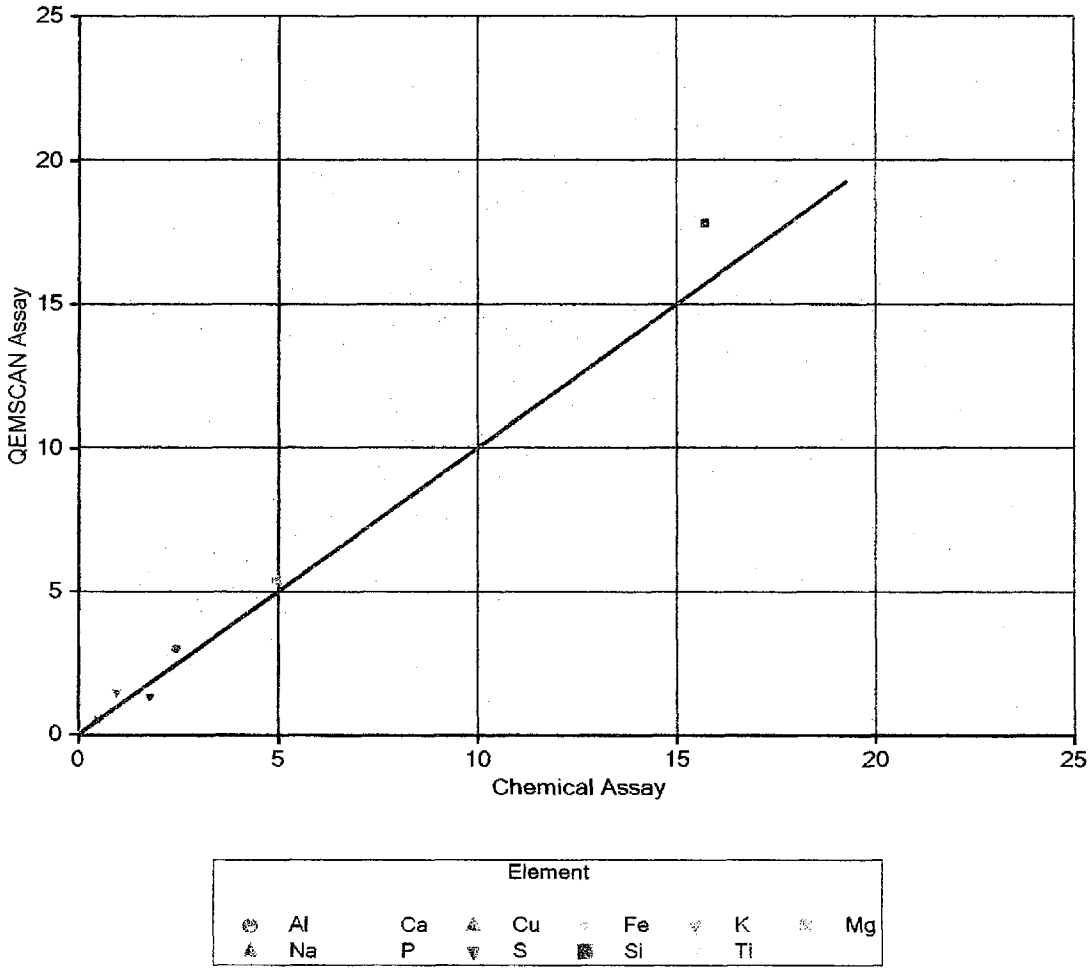
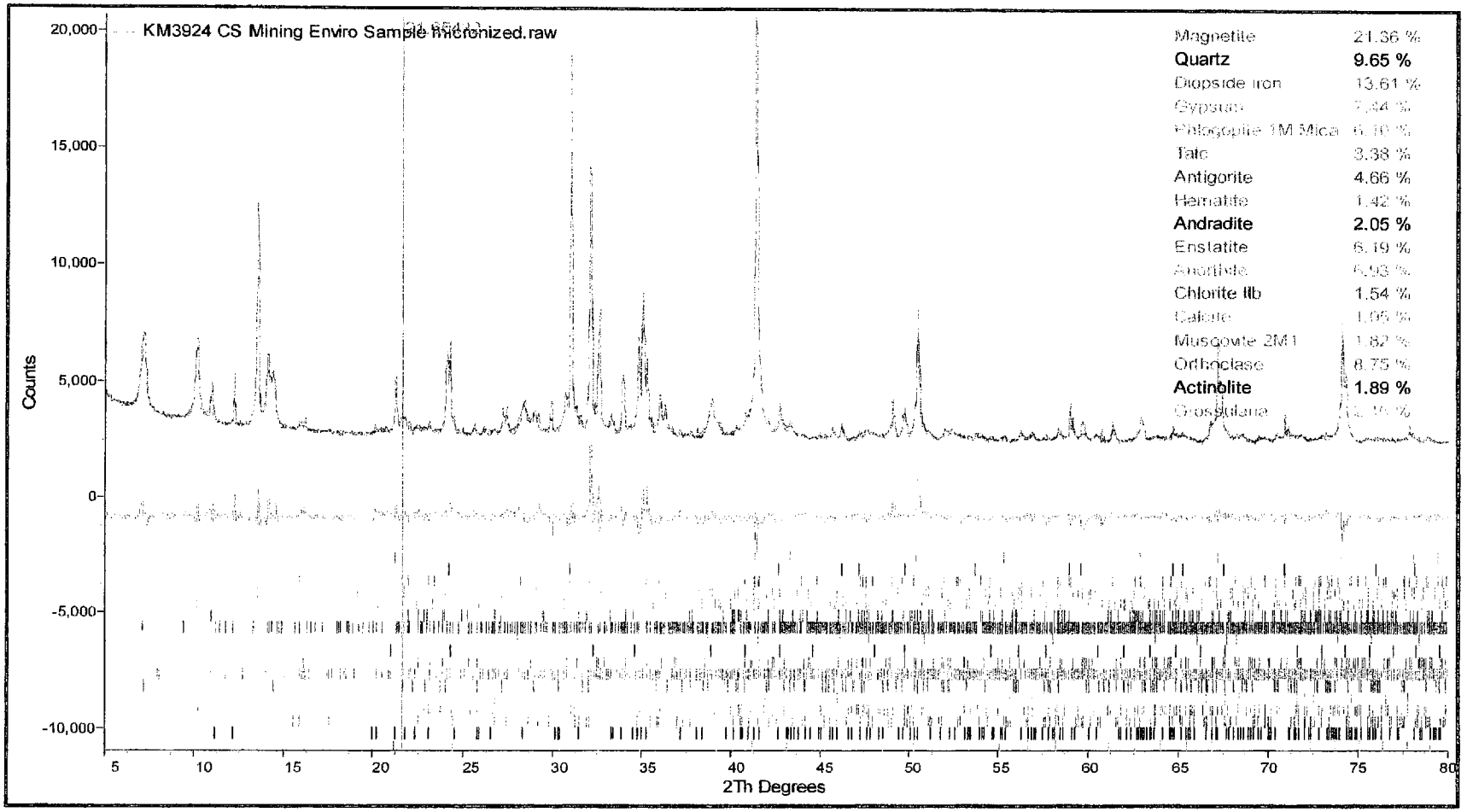


TABLE 2
MINERAL CONTENT OF THE ENVIRO SAMPLE
SEMI-QUANTITATIVE PHASE ANALYSIS (WT.%) USING XRD-RIETVELD METHOD
KM3924

Minerals	CS Mining Enviro Sample
Magnetite	21
Hematite	1
Quartz	10
Feldspar (Plagioclase)	7
Feldspar (K-feldspar)	9
Pyroxene	20
Amphibole	2
Micas	8
Serpentine	5
Talc	3
Garnet	4
Gypsum	7
Chlorite	2
Calcite	1
Total	100

Note: 1) The sample was ground under propanol in a vibratory McCrone micronizing mill for 10 minutes.
2) Step-scan X-ray powder diffraction data were collected over range of 5-80 °2θ with CoKa radiation using a Bruker XRD D4 diffractometer.
3) X-ray powder diffraction data were refined using Rietveld program Topas 4.2 (Bruker AXS) and structures from the Topas Database and Open Crystallography Database.
4) Minerals with weight percent less than 1%, were mostly unidentified.
5) The mineral content reported represents the relative amounts of crystalline phases normalized to 100%.
6) Pyroxene includes Diopside and Enstatite.
7) Micas includes Phlogopite and Muscovite.
8) Garnet includes Andradite and Grossularia.
9) Feldspar (Plagioclase) includes Anorthite.
10) Feldspar (K-feldspar) includes Orthoclase.
11) Amphibole includes Actinolite.
12) The pattern shows a small hump at about 21-22 °2θ, which is fitted with a calculated peak (vertical blue line).

FIGURE 2
RIETVELD REFINEMENT PLOT - ENVIRO SAMPLE
KM3924



Note: 1) Blue Line - Measured Intensity Peaks at Different Angles.
2) Red Line - Calculated Patterns Using TOPAS Revield Programs Based on Mineral Crystalline Structures.
3) Solid Grey Line – Differences Between Measured and Calculated Intensities.
4) Vertical Bars - Positions of All Bragg reflections.

Appendix D
Water Quality Data

Southern Utah University
WATER LAB
"Chemical and Bacteriological Testing"

Report of Analysis

Name: Western Utah Copper Company
PO Box 490
Milford, UT 84751

Sample Date: 5/29/2009 10:02:00 AM
Receipt Date: 5/29/2009 1:52:00 PM
Report Date: 10/7/2009
Sample Site: Mill South Well WW-6

Sample ID#: K2009 01623
Sample Type: Ground Water
Sampler: RON WUNDERLICH

Parameter	Sample Result	Units	MRL	Method	Analysis Date	Analysis Time	Analyst
Receiving							
Receiving pH	7.21	SU	0	4500 B	5/29/2009	3:25:00 PM	SH
Receiving Temperature	12.8	C	0	2550	5/29/2009	3:25:00 PM	SH
Chemical							
Cyanide	<0.1	mg/L	0.05	4500-CN-C	6/12/2009	9:10:00 AM	ZB
Official pH	7.36	SU	4	4500 H	5/29/2009	3:20:00 PM	SH
Metals							
Arsenic	<5	ug/L	10	3113 B	9/26/2009	5:32:00 PM	TP
Barium	0.029	mg/L	0.005	200.7	6/12/2009	4:17:00 PM	CTF
Beryllium	ND	mg/L	0.001	200.8	6/12/2009	4:17:00 PM	CTF
Cadmium	<1	ug/L	1	3113 B	7/30/2009	10:45:00 AM	TP
Chromium	ND	mg/L	0.002	200.7	6/12/2009	4:17:00 PM	CTF
Copper	<50	ug/L	50	3113 B	6/25/2009	9:01:00 AM	TP
Lead	<5	ug/L	5	3113 B	9/29/2009	2:28:00 PM	TJ
Mercury	ND	mg/L	0.0002	200.8	6/10/2009	5:00:00 PM	CTF
Nickel	<10	ug/L	5	3113 B	8/11/2009	11:29:00 AM	TP
Selenium	<5	ug/L	5	3113 B	7/1/2009	8:22:00 PM	TP
Thallium	ND	mg/L	0.0005	200.8	6/10/2009	5:00:00 PM	CTF
Minerals							
Fluoride	0.435	mg/L	0.4	4500 F C	6/13/2009	1:05:00 PM	ZB
Sodium	81.0	mg/L	5	3111 B	7/6/2009	12:01:00 PM	TP
Sulfate	798	mg/L	5	375.4	6/6/2009	11:40:00 AM	SF

Southern Utah University
WATER LAB
"Chemical and Bacteriological Testing"

Report of Analysis

Name:	Western Utah Copper Company PO Box 492 Milford, UT 84751	Sample ID#: Sample Type: Sampler:	S2009 01623 Ground Water RON WUNDERLICH
Sample Date:	5/29/2009 10:02:00 AM		
Receipt Date:	5/29/2009 1:52:00 PM		
Report Date:	10/7/2009		
Sample Site:	Mill South Well MW-6		

Parameter	Sample Result	Units	MDL	Method	Analysis Date	Analysis Time	Analyst
Nutrient							
Nitrate	<0.1	mg/L	0.1	353.3	6/6/2009	10:30:00 AM	SH
Nitrate+Nitrite Total	<0.1	mg/L	0.1	353.3	6/6/2009	10:30:00 AM	SH
Nitrite	<0.1	mg/L	0.1	353.3	5/30/2009	1:00:00 PM	SH
Physical							
Total Dissolved Solids	1760	mg/L	20	2540 C	6/1/2009	5:10:00 PM	KL
Turbidity	1.18	NTU	0.1	180.1	5/29/2009	2:30:00 PM	TJ

Report Approved By: _____
[illegible], Lab Quality Director

351 West Center • Cedar City, Utah 84720 • (435) 586-7914 • (435) 865-8395 • Fax (435) 865-8051
Southern Utah University Science Center • Room 206
www.suu.edu/waterlab

Southern Utah University
"Chemical and Bacteriological Testing"

Report of Analysis

Name:	Western Utah Copper Company PO Box 482 Milford, UT 84751	Sample ID:	[illegible]
Sample Date:	5/29/2009 [illegible]	Sample Type:	Ground Water
Receipt Date:	5/29/2009 1:52:00 PM	Sampler:	RON WUNDERLICH
Report Date:	10/7/2009		
Sample Site:	[illegible] North Well WW-7		

Parameter	Sample Result	Units	MRL	Method	Analysis Date	Analysis Time	Analyst
Receiving							
Receiving pH	[illegible]	SU	0	4500 H	5/29/2009	[illegible] PM	SH
Receiving Temperature	14.5	C	[illegible]	2550	5/29/2009	[illegible] PM	SH
Chemical							
Cyanide	[illegible]	mg/L	[illegible]	4500-CN-C	6/12/2009	9:10:00 AM	ZB
[illegible] pH	6.72	SU	4	4500 H	5/29/2009	5:20:00 PM	SH
Metals							
Arsenic	<5	ug/L	10	3113 B	9/26/2009	[illegible]:32:00 PM	TP
Barium	[illegible]	mg/L	0.005	200.7	6/12/2009	4:13:00 PM	CTF
Beryllium	ND	mg/L	0.001	200.7	6/12/2009	4:13:00 PM	CTF
Cadmium	<1	ug/L	1	3113 B	7/30/2009	10:45:00 AM	TP
Chromium	ND	mg/L	0.005	200.7	6/12/2009	4:13:00 PM	CTF
Copper	<50	ug/L	50	3113 B	6/25/2009	9:01:00 AM	TP
Lead	5.65	ug/L	5	3113 B	9/29/2009	2:28:00 PM	TJ
Mercury	ND	mg/L	0.0002	200.8	6/10/2009	5:00:00 PM	CTF
Nickel	<10	ug/L	5	3113 B	8/11/2009	11:29:00 AM	TP
Selenium	<5	ug/L	5	3113 B	6/23/2009	10:06:00 AM	TP
Thallium	ND	ug/L	2	200.8	6/10/2009	5:00:00 PM	CTF
Minerals							
Fluoride	<0.4	mg/L	0.4	4500 F C	6/13/2009	1:05:00 PM	ZB
Sodium	[illegible]	mg/L	5	3111 B	7/6/2009	12:01:00 PM	TP
Sulfate	[illegible]	mg/L	5	375.4	6/6/2009	11:40:00 AM	SF

Southern Utah University

"Chemical and Bacteriological Testing"

Report of Analysis

Name:	Western Utah Copper Company		Sample ID:	[illegible]
	PO Box 492		Sample Type:	[illegible]
	Milford, UT 84751		Sampler:	RON WUNDERLICH
Sample Date:	5/29/2009 9:40:00 AM			
Receipt Date:	5/29/2009 1:50:00 PM			
Report Date:	10/7/2009			
Sample Site:	[illegible] WW-7			

Parameter	Sample Result	Units	MRL	Method	Analysis Date	Analysis Time	Analyst
Inorganic							
Nitrate	0.310	mg/L	0.1	353.2	6/6/2009	10:30:00 AM	SH
Nitrate-Nitrite total	0.310	mg/L	0.1	353.2	6/6/2009	10:30:00 AM	SH
Nitrite	<0.1	mg/L	0.1	353.2	5/29/2009	1:00:00 PM	SH
Physical							
Total Dissolved Solids	1410	mg/L	20	2540 C	6/3/2009	5:10:00 PM	KL
Turbidity	0.05	NTU	0.1	180.1	5/29/2009	2:30:00 PM	TJ

Report Approved By: ______________________

Dr. Kevin Lafferty, Director

351 West Center • Cedar City, Utah 84720 • (435) 586-7914 • (435) 865-8395 • Fax (435) 865-8051
Southern Utah University Science Center • Room 206
www.suu.edu/waterlab

WATER ANALYSIS REPORT

WESTERN UTAH COPPER
Milford, UT

Sampled: 10-APR-2009
Reported: 23-APR-2009
Field Rep: Espinoza, Carman J.
91000437

	WW-3 WUCC WELL #1 T0417019	WW-6 WUCC WELL #2 T0417020
pH	7.0	7.3
Specific Conductance, at 25°C, µmhos	2220	2560
Alkalinity, "P" as $CaCO_3$, ppm	0	0
Alkalinity, "M" as $CaCO_3$, ppm	297	84
Sulfur, Total, as SO_4, ppm	528	697
Chloride, as Cl, ppm	236	364
Hardness, Total, as $CaCO_3$, ppm	1090	1260
Calcium Hardness, Total, as $CaCO_3$, ppm	810	893
Magnesium Hardness, Total, as $CaCO_3$, ppm	279	364
Copper, Total, as Cu, ppm	< 0.05	< 0.05
Iron, Total, as Fe, ppm	< 0.05	0.40
Sodium, as Na, ppm	68	89
Potassium, as K, ppm	2.0	8.4
Phosphate, Total, as PO_4, ppm	< 0.4	< 0.4
Phosphate, Ortho-, as PO_4, ppm	0.2	0.2
Silica, Total, as SiO_2, ppm	19.6	25

Date: 8/13/96

To: Centurion Mines
331 South Rio Grande, Suite #201
Salt Lake City, UT 84101

Group #: 9649
Lab #: 96-U010815
Sample Desc: OK Mine (MW-1)

Date Sampled: 7/18/96
Date Submitted: 7/19/96

Time Sampled: 14:00
Time Received: 11:45

CERTIFICATE OF ANALYSIS

PARAMETER	RESULT	MDL	DATE ANALYZED	METHOD	ANALYST
INORGANIC PARAMETERS					
Fluoride, mg/L	1.4	0.1	8/12/96 8:45	EPA 340.2M	KAL
Mercury (T), as Hg, mg/L	< 0.0002	0.0002	8/ 7/96 13:13	SW 846 7471	KA
Nitrate, Nitrogen, mg/L	3	1.6	8/ 6/96 13:29	EPA 353.1M	TH
Nitrite, Nitrogen, mg/L	0.123	0.005	7/19/96 18:00	EPA 354.1	KA
Nitrate/Nitrite-Nitrogen, mg/L	3	1.6	8/ 6/96 13:29	EPA 353.1M	TH
pH, units	6.60	0.05	7/19/96 14:15	SW 846 9045	LS
Total Dissolved Solids, mg/L	1,010	5	7/26/96 14:30	EPA 160.1	LS
Antimony (T), as Sb, mg/L	< 0.08	0.08	7/30/96 11:37	SW-846 6010	MA
Arsenic (T), as As, mg/L	< 0.06	0.06	7/30/96 11:37	SW-846 6010	MA
Barium (T), as Ba, mg/L	0.07	0.01	7/30/96 11:37	SW-846 6010	MA
Beryllium (T), as Be, mg/L	< 0.001	0.001	7/30/96 11:37	SW-846 6010	MA
Cadmium (T), as Cd, mg/L	< 0.005	0.005	7/30/96 11:37	SW-846 6010	MA
Chromium(T), as Cr, mg/L	0.005	0.005	7/30/96 11:37	SW-846 6010	MA
Copper (T), as Cu, mg/L	< 0.01	0.01	7/30/96 11:37	SW-846 6010	MA
Lead (T), as Pb, mg/L	< 0.04	0.04	7/30/96 11:37	SW-846 6010	MA
Nickel (T), as Ni, mg/L	< 0.01	0.01	7/30/96 11:37	SW-846 6010	MA
Selenium (T), as Se, mg/L	< 0.08	0.08	7/30/96 11:37	SW-846 6010	MA
Silver (T), as Ag, mg/L	0.008	0.005	7/30/96 11:37	SW-846 6010	MA
Thallium (T), as Tl, mg/L	< 0.15	0.15	7/30/96 11:37	SW-846 6010	MA
Zinc (T), as Zn, mg/L	0.68	0.01	7/30/96 11:37	SW-846 6010	MA
Receiving Temperature, C	8	0	7/19/96 11:45		SP

Approved By: _____

1250 LAMOILLE HWY (generic.rpt)
ELKO, NEVADA 89801
702 738 0111 PHONE
702 753 7255 FAX

6100 SOUTH STRATLER
SALT LAKE CITY UTAH 84107 6905
801 262 7299 PHONE
801 262 7378 FAX

Date: 7/ 5/96

To: West Hills Excavating

1208 South 200 West
Milford, UT 84751

Group #: 8940
Lab #: 96-U008192
Project: OK MINE
Sample Desc: MW-1

Date Sampled: 6/12/96
Date Submitted: 6/14/96

Time Sampled: 18:00
Time Received: 16:30

CERTIFICATE OF ANALYSIS

PARAMETER	RESULT	MDL	DATE ANALYZED	METHOD	ANALYST
INORGANIC PARAMETERS					
Fluoride, mg/L	1.5	0.2	7/ 3/96	EPA 340.2	TH
Mercury (T), as Hg, mg/L	< 0.0002	0.0002	6/21/96 10:26	EPA 245.1	KA
Nitrate, Nitrogen, mg/L	3.4	0.32	6/27/96 11:00	EPA 353.1	JBK
Nitrite, Nitrogen, mg/L	0.006	0.005	6/14/96 18:15	EPA 354.1	KA
pH, units	7.20	0.05	6/15/96 12:30	EPA 150.1	LS
Total Dissolved Solids, mg/L	785	12	6/20/96 4:00	EPA 160.1	MO
Barium (T), as Ba, mg/L	0.07	0.01	6/21/96 10:08	EPA 200.7	MA
Beryllium (T), as Be, mg/L	< 0.001	0.001	6/21/96 10:08	EPA 200.7	MA
Cadmium (T), as Cd, mg/L	< 0.005	0.005	6/21/96 10:08	EPA 200.7	MA
Chromium(T), as Cr, mg/L	< 0.005	0.005	6/21/96 10:08	EPA 200.7	MA
Copper (T), as Cu, mg/L	0.02	0.01	6/21/96 10:08	EPA 200.7	MA
Nickel (T), as Ni, mg/L	< 0.01	0.01	6/21/96 10:08	EPA 200.7	MA
Silver (T), as Ag, mg/L	0.006	0.005	6/21/96 10:08	EPA 200.7	MA
Zinc (T), as Zn, mg/L	0.76	0.01	6/21/96 10:08	EPA 200.7	MA
Antimony (T), as Sb, mg/L	< 0.003	0.003	6/27/96 19:41	EPA 200.9	EG
Arsenic (T), as As, mg/L	< 0.005	0.005	7/ 2/96 18:16	EPA 200.9	EG
Lead (T), as Pb, mg/L	< 0.005	0.005	7/ 2/96 11:32	EPA 200.9	EG
Selenium (T), as Se, mg/L	< 0.002	0.002	7/ 1/96 18:28	EPA 200.9	EG
Thallium (T), as Tl, mg/L	0.002	0.001	7/ 2/96 16:55	EPA 200.9	EG
Receiving Temperature, C	2	0	6/14/96 16:30		RCG

Approved By: Russell Buckman

250 LAMOILLE HW(generic.rpt)
LKO NEVADA 89801
702 738 3111 PHONE
702 753 7255 FAX

6100 SOUTH STRATLER
SALT LAKE CITY UTAH 84107 6905
801 262 7299 PHONE
801 262 7378 FAX

Date: 7/ 5/96

To: West Hills Excavating

1208 South 200 West
Milford, UT 84751

Group #: 8940
Lab #: 96-U008192
Project: OK MINE
Sample Desc: MW-1

Date Sampled: 6/12/96
Date Submitted: 6/14/96

Time Sampled: 18:00
Time Received: 16:30

CERTIFICATE OF ANALYSIS

PARAMETER	RESULT	MDL	DATE ANALYZED	METHOD	ANALYST
INORGANIC PARAMETERS					

NOTE: Sample submitted on ice.

Approved By: Russell Eackman

3351 LAMOILLE HW(generic.rpt)
ELKO, NEVADA 89801
702 738 0111 PHONE
702 753 7235 FAX

6160 SOUTH STRATLER
SALT LAKE CITY, UTAH 84107 6906
801 262 7299 PHONE
801 262 7378 FAX

Appendix E
Drillers Logs: WW-3, WW-6
Truck Shop Well and
Geologic Log of MW-1

WM - 3

WELL DRILLER'S REPORT
State of Utah
Division of Water Rights

For additional space, use "Additional Well Data Form" and attach

Well Identification

Non-Production Well: 0871002M00 WIN: 431993

Owner *Note any changes*

Western Utah Copper Company
P.O. Box 492
Milford, UT 84751

Contact Person/Engineer: _____

Well Location *Note any changes*

N 380 E 1090 from the SW corner of section 31, Township 26S, Range 11W, SL B&M
surface elev. ≈ 6640
(by inspection)

Location Description: (address, proximity to buildings, landmarks, ground elevation, local well #)

Drillers Activity Start Date: 10-9-08 Completion Date: 12-12-08

Check all that apply: ☒ New ☐ Repair ☐ Deepen ☐ Clean ☐ Replace ☐ Public Nature of Use: _____

If a replacement well, provide location of new well. _____ feet north/south and _____ feet east/west of the existing we

DEPTH (feet) FROM	TO	BOREHOLE DIAMETER (in)	DRILLING METHOD	DRILLING FLUID
0	680	12 1/4"	Rotary	Foam

Well Log

DEPTH (feet) FROM	TO	WATER	PERMEABLE High	PERMEABLE Low	UNCONSOLIDATED CLAY	SILT	SAND	GRAVEL	COBBLES	BOULDER	OTHER	CONSOLIDATED ROCK TYPE	COLOR	DESCRIPTION AND REMARKS (e.g., relative %, grain size, sorting, angularity, bedding, grain composition density, plasticity, shape, cementation, consistancy, water bearing, odor, fracturing, minerology, texture, degree of weathering, hardness, water quality, etc.)
0	15											Topsoil	Brown	
15	40											Dolamite	Gray/Brown	Hard
40	90											Dolamite	Gray/brown	
90	105											Dolamite	Gray	Hard
105	120											Dolamite	Dark brown + some gray	
120	165											Dolamite	Gray	Really hard
165	185											"	Gray/Green	" "
185	200											"	Gray	" "
200	240	X										"	Gray/Green	" "
240	280											"	Gray/Brown	" "

Static Water Level

Date 12-12-08 Water Level 186 feet Flowing? ☐ Yes ☐ No
Method of Water Level Measurement pump Pressure If Flowing, Capped Pressure _____ PSI
Point to Which Water Level Measurement was Referenced ground Elevation _____
Height of Water Level reference point above ground surface _____ feet Temperature _____ degrees ☐ C ☐ F

Well Log

Construction Information

DEPTH (feet) FROM	DEPTH (feet) TO	CASING: CASING TYPE AND MATERIAL/GRADE	WALL THICK (in)	NOMINAL DIAM. (in)	DEPTH (feet) FROM	DEPTH (feet) TO	☐SCREEN ☒PERFORATIONS ☐OPEN BOTTOM: SCREEN SLOT SIZE OR PERF SIZE (in)	SCREEN DIAM. OR PERF LENGTH (in)	SCREEN TYPE OR NUMBER PER (per round/interval)
+2	680	Steel A53B	.250	8.625	305	330	1/8"	2 1/2	6
					380	405	1/8"	2 1/2	6
					435	460	1/8"	2 1/2	6
					485	510	1/8	2 1/2	6
					510 610	585 680	1/8 1/8	2 1/2 2 1/2	6 6

Well Head Configuration: Capped — Access Port Provided? ☒Yes ☐No

Casing Joint Type: Welded — Perforator Used: Mill

Was a Surface Seal Installed? ☒Yes ☐No — Depth of Surface Seal: 30 feet — Drive Shoe? ☐Yes ☐No

Surface Seal Material Placement Method: Pour In

Was a temporary surface casing used? ☒Yes ☐No If yes, depth of casing: 20 feet diameter: 12 inches

DEPTH (feet) FROM	DEPTH (feet) TO	SURFACE SEAL / INTERVAL SEAL / FILTER PACK / PACKER INFORMATION: SEAL MATERIAL, FILTER PACK and PACKER TYPE and DESCRIPTION	Quantity of Material Used (if applicable)	GROUT DENSITY (lbs./gal., # bag mix, gal./sack etc.
0	30	Bentonite Hole Plug	17	50# bag
30	680	Pea Gravel	35 ton	

Well Development and Well Yield Test Information

DATE	METHOD	YIELD	Units Check One GPM	Units Check One CFS	DRAWDOWN (ft)	TIME PUMPED (hrs & min)
12-12-09	Air lift	350	X			6 HRS.

Pump (Permanent)

Pump Description: _____ Horsepower: _____ Pump Intake Depth: _____ feet

Approximate Maximum Pumping Rate: _____ Well Disinfected upon Completion? ☒Yes ☐No

Comments Description of construction activity, additional materials used, problems encountered, extraordinary circumstances, abandonment procedures. *Use additional well data form for more space.*

Well Driller Statement

This well was drilled and constructed under my supervision, according to applicable rules and regulations, and this report is complete and correct to the best of my knowledge and belief.

Name GARDNER BROTHERS DRILLING (Person, Firm, or Corporation - Print or Type) License No. 492

Signature Dale Gardner (Licensed Well Driller) Date 12-18-09

WELL DRILLER'S REPORT ADDTIONAL DATA FORM
State of Utah
Division of Water Rights

Page ____ of ____

Well Identification

Non-Production Well: 0871002M00

Owner *Note any changes*

Western Utah Copper Company
P.O. Box 492
Milford, UT 84751

Contact Person/Engineer: _____

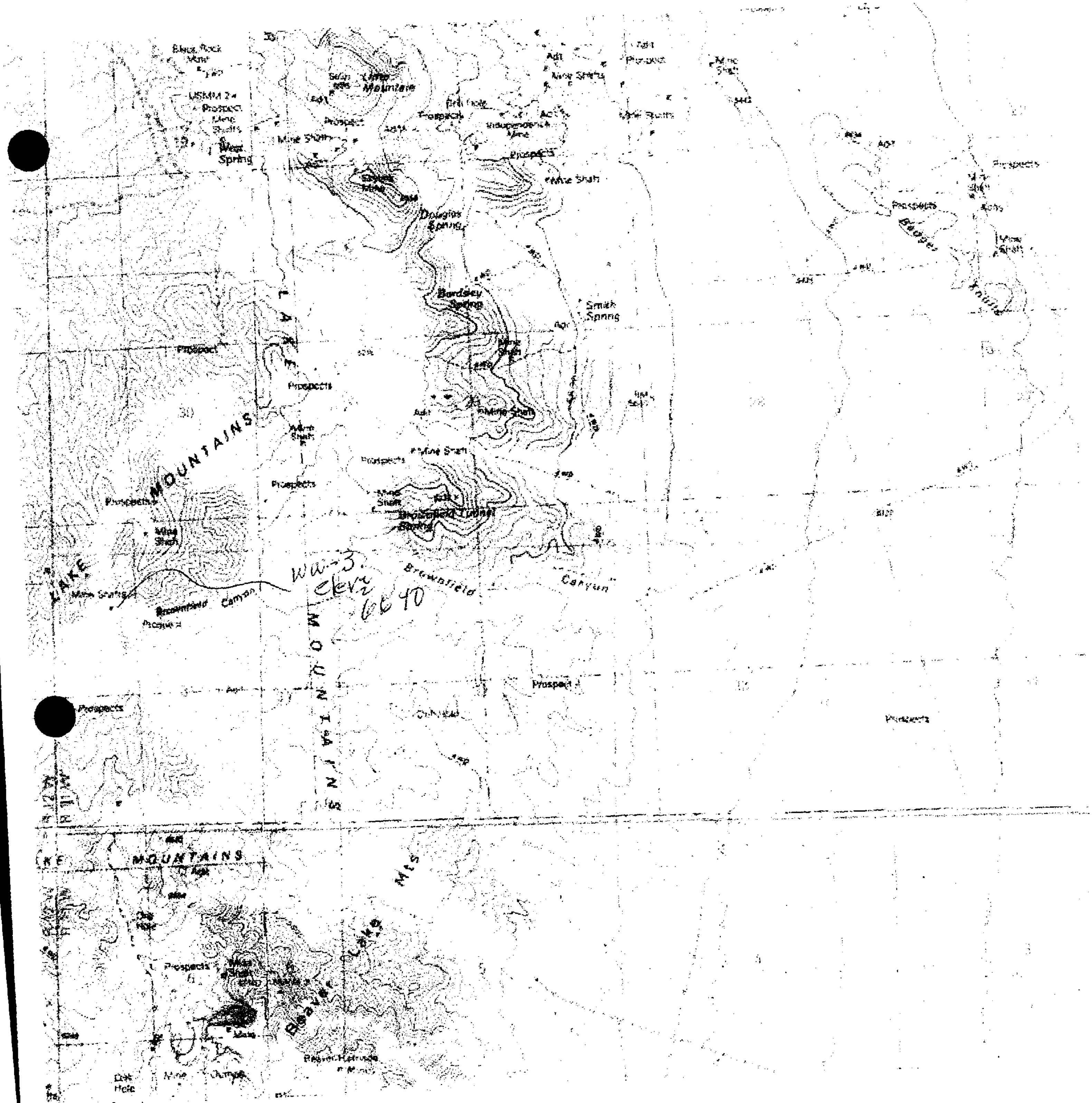
Well Location *Note any changes*

N 380 E 1090 from the SW corner of section 31, Township 26S, Range 11W, SL B&M

Location Description: (address, proximity to buildings, landmarks, ground elevation,local well #)

Well Log

DEPTH (feet) FROM	TO	WATER	PERMEABLE High	PERMEABLE Low	UNCONSOLIDATED CLAY	SILT	SAND	GRAVEL	COBBLES	BOULDER	OTHER	CONSOLIDATED ROCK TYPE	COLOR	DESCRIPTION AND REMARKS (e.g., relative %, grain size, sorting, angularity, bedding, grain composition density, plasticity, shape, cementation, consistancy, water bearing, odor, fracturing, minerology, texture,degree of weathering, hardness, water quality, etc.)
280	315	X										Dolamite	Gray	Really hard
315	340	X										"	Gray/Brown	" "
340	390											"	Gray/Red	" "
390	420	X										"	Gray/Green	" "
420	470											"	Gray	" "
470	500	X										"	Gray/Brown	" "
500	575	X										"	Gray	" "
575	630	X										"	Gray/Red	" "
630	660	X										"	Gray	" "
660	680	X										"	Gray/Brown	Softer


Black Rock Mine
West Spring
Douglas Spring
Bardsley Spring
Smith Spring
Mine Shaft
Prospects
Adit
Independence Mine
LAKE MOUNTAINS
Brownfield Canyon
Brownfield Canyon
Brownfield Tunnel
WW-3
elev
6640
MOUNTAINS
Mts
Badger
Prospect
Dig Hole
Mine Dumps

WELL DRILLER'S REPORT
State of Utah
Division of Water Rights

For additional space, use "Additional Well Data Form" and attach

Well Identification

Change Application: a33060 (71-4763) WIN: 431658

Owner *Note any changes*

Western Utah Copper Co.
P.O. Box 492
Milford, UT 84751

Contact Person/Engineer: _____

Well Location *Note any changes*

N 943 E 1438 from the SW corner of section 08, Township 27S, Range 11W, SL B&M

Surface elev. ≈ 5590' (by inspection)

Location Description: (address, proximity to buildings, landmarks, ground elevation, local well #)

Drillers Activity Start Date: 7-28-08 Completion Date: 9-26-08

Check all that apply: ☒ New ☐ Repair ☐ Deepen ☐ Clean ☐ Replace ☐ Public Nature of Use: _____

If a replacement well, provide location of new well. _____ feet north/south and _____ feet east/west of the existing well.

DEPTH (feet) FROM	TO	BOREHOLE DIAMETER (in)	DRILLING METHOD	DRILLING FLUID
0	560	12¼	Rotary	Mud

Well Log

DEPTH (feet) FROM	TO	WATER	PERMEABLE High	PERMEABLE Low	UNCONSOLIDATED CLAY	SILT	SAND	GRAVEL	COBBLES	BOULDER	OTHER	CONSOLIDATED ROCK TYPE	COLOR	DESCRIPTION AND REMARKS (e.g., relative %, grain size, sorting, angularity, bedding, grain composition density, plasticity, shape, cementation, consistancy, water bearing, odor, fracturing, minerology, texture, degree of weathering, hardness, water quality, etc.)
0	50												Brown	Topsoil
50	220											Dolomite	Light Gray	Not very hard
220	285						X						Dark Gray	Very Hard & Broken
285	295						X	X					"	well rounded
295	310						X						"	Very broken & hard
310	320				X								Brown	
320	480						X						Dark Gray	Very hard & broken
480	500				X									
500	515						X	X					Dark Gray	Well Rounded
515	560						X						"	Hard & broken

Static Water Level

Date 9-26-08 Water Level 96 feet Flowing? ☐ Yes ☐ No

Method of Water Level Measurement probe If Flowing, Capped Pressure _____ PSI

Point to Which Water Level Measurement was Referenced ground Elevation _____

Height of Water Level reference point above ground surface _____ feet Temperature _____ degrees ☐ C ☐ F

Well Log

Construction Information

DEPTH (feet) FROM	TO	CASING TYPE AND MATERIAL/GRADE	WALL THICK (in)	NOMINAL DIAM. (in)
+2	560	Steel A53B	.250	8.625

DEPTH (feet) FROM	TO	☐SCREEN ☒PERFORATIONS ☒OPEN BOTTOM SCREEN SLOT SIZE OR PERF SIZE (in)	SCREEN DIAM. OR PERF LENGTH (in)	SCREEN TYPE OR NUMBER PERF (per round/interval)
160	180	1/8	2 1/2	16
200	220	1/8	2 1/2	16
280	300	1/8	2 1/2	16
460	480	1/8	2 1/2	16
510	560	1/8	2 1/2	16

Well Head Configuration: Capped — Access Port Provided? ☒Yes ☐No

Casing Joint Type: Welded — Perforator Used: Mill

Was a Surface Seal Installed? ☒Yes ☐No — Depth of Surface Seal: 30 feet — Drive Shoe? ☐Yes ☐No

Surface Seal Material Placement Method: Pour in

Was a temporary surface casing used? ☐Yes ☒No If yes, depth of casing: ____ feet — diameter: ____ inches

DEPTH (feet) FROM	TO	SURFACE SEAL / INTERVAL SEAL / FILTER PACK / PACKER INFORMATION: SEAL MATERIAL, FILTER PACK and PACKER TYPE and DESCRIPTION	Quantity of Material Used (if applicable)	GROUT DENSITY (lbs./gal., # bag mix, gal./sack etc.)
0	30	Bentonite Hole Plug	50	50# bags
30	560	3/8" Gravel	22 yards	

Well Development and Well Yield Test Information

DATE	METHOD	YIELD	Units Check One GPM	CFS	DRAWDOWN (ft)	TIME PUMPED (hrs & min)
9-26-08	Air lift	150	X			8 Hrs.

Pump (Permanent)

Pump Description: ____ Horsepower: ____ Pump Intake Depth: ____ feet

Approximate Maximum Pumping Rate: ____ Well Disinfected upon Completion? ☒Yes ☐No

Comments

Description of construction activity, additional materials used, problems encountered, extraordinary Circumstances, abandonment procedures. *Use additional well data form for more space.*

Well Driller Statement

This well was drilled and constructed under my supervision, according to applicable rules and regulations, and this report is complete and correct to the best of my knowledge and belief.

Name GARDNER BROTHERS DRILLING (Person, Firm, or Corporation - Print or Type) — License No. 492

Signature Dale Gardner (Licensed Well Driller) — Date 10-10-08

TRUCK SHOP WELL

WELL DRILLER'S REPORT
State of Utah
Division of Water Rights

For additional space, use "Additional Well Data Form" and attach

Well Identification

Change Application: a36058 (71-4396) WIN: 435666

Owner *Note any changes*

CS Mining, LLC
P. O. Box 608
1208 South 200 West
Milford UT 84751

Contact Person/Engineer: Ron Wunderlich

Well Location *Note any changes*

S 1650 W 2300 from the NE corner of section 34, Township 27S, Range 11W, SL B&M

Location Description: (address, proximity to buildings, landmarks, ground elevation,local well #)

Drillers Activity Start Date: 2-16-12 Completion Date: 5-11-12

Check all that apply: ☒ New ☐ Repair ☐ Deepen ☐ Clean ☐ Replace ☐ Public Nature of Use:

If a replacement well, provide location of new well. _____ feet north/south and _____ feet east/west of the existing well.

DEPTH (feet) FROM	TO	BOREHOLE DIAMETER (in)	DRILLING METHOD	DRILLING FLUID
0	833'	18½"	Mud Rotary	Bentonite / Polymer
833	875	9⅞"	"	"

Well Log

DEPTH (feet) FROM	TO	WATER	PERMEABLE High	PERMEABLE Low	UNCONSOLIDATED CLAY	SILT	SAND	GRAVEL	COBBLES	BOULDER	OTHER	CONSOLIDATED ROCK TYPE	COLOR	DESCRIPTION AND REMARKS (e.g., relative %, grain size, sorting, angularity, bedding, grain composition density, plasticity, shape, cementation, consistancy, water bearing, odor, fracturing, minerology, texture,degree of weathering, hardness, water quality, etc.)
0	5				x		x	x					Brown	Mixed Fill
5	208				x		x	x					Brown	
208	216							x	x					
216	310				x		x	x					Brown	
310	334	x		x				x	x					
334	378				x		x	x					Brown	
378	385	x		x				x	x					
385	577				x			x	x				Brown	
577	593	x	x					x	x					
593	698	x	x				x	x	x					

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MAY 22 2012
WATER RIGHTS
CEDAR CITY

Static Water Level

Date 3-30-12 Water Level 295 feet Flowing? ☐ Yes ☒ No

Method of Water Level Measurement Sounder If Flowing, Capped Pressure — PSI

Point to Which Water Level Measurement was Referenced Top of Casing Elevation —

Height of Water Level reference point above ground surface 2 feet Temperature — degrees ☐ C ☐ F

Well Log

WELL DRILLER'S REPORT ADDTIONAL DATA FORM
State of Utah
Division of Water Rights

Well Identification

Change Application: a36058 (71-4396)

Owner *Note any changes*

CS Mining, LLC
P. O. Box 608
1208 South 200 West
Milford UT 84751

Contact Person/Engineer: Ron Winegeich

Well Location *Note any changes*

S 1650 W 2300 from the NE corner of section 34, Township 27S, Range 11W, SL B&M

Location Description: (address, proximity to buildings, landmarks, ground elevation.local well #)

Well Log

DEPTH (feet) FROM	TO	WATER	PERMEABLE High	PERMEABLE Low	UNCONSOLIDATED CLAY	SILT	SAND	GRAVEL	COBBLES	BOULDER	OTHER	CONSOLIDATED ROCK TYPE	COLOR	DESCRIPTION AND REMARKS (e.g., relative %, grain size, sorting, angularity, bedding, grain composition density, plasticity, shape, cementation, consistancy, water bearing, odor, fracturing, minerology, texture.degree of weathering, hardness, water quality, etc.)
698	711				x								Brown	
711	860	x	x							x				
860	875										x		Black	

Well Log

Construction Information

DEPTH (feet) FROM	DEPTH (feet) TO	CASING: CASING TYPE AND MATERIAL/GRADE	CASING: WALL THICK (in)	CASING: NOMINAL DIAM. (in)	DEPTH (feet) FROM	DEPTH (feet) TO	☐SCREEN ☒PERFORATIONS ☒OPEN BOTTOM: SCREEN SLOT SIZE OR PERF SIZE (in)	SCREEN DIAM. OR PERF LENGTH (in)	SCREEN TYPE OR NUMBER PERF (per round/interval)
+2	835	A 53 GRADE B	.250	10 3/4"	315	355	.312	2.5	10 PER ROUNDS 20 PER FOOT
					395	435			
					475	515	"	"	"
					565	595			
					635	675	"	"	"
					715	755			
					795	835	"	"	"

Well Head Configuration: _____ Access Port Provided? ☐Yes ☒No

Casing Joint Type: BUTT WELD Perforator Used: MILLED SLOTS

Was a Surface Seal Installed? ☒Yes ☐No Depth of Surface Seal: 30 feet Drive Shoe? ☐Yes ☐No

Surface Seal Material Placement Method: TREMIED BOTTOM TO POP

Was a temporary surface casing used? ☐Yes ☒No If yes, depth of casing: _____ feet diameter: _____ inches

DEPTH (feet) FROM	DEPTH (feet) TO	SURFACE SEAL / INTERVAL SEAL / FILTER PACK / PACKER INFORMATION: SEAL MATERIAL, FILTER PACK and PACKER TYPE and DESCRIPTION	Quantity of Material Used (if applicable)	GROUT DENSITY (lbs./gal., # bag mix, gal./sack etc.)
0	30	BENTONITE HOLE PLUG	34 CUBIC FT	100% WET
30	835	3/8 PEA GRAVEL	34 CUBIC YARDS	100% FULL

Well Development and Well Yield Test Information

DATE	METHOD	YIELD	Units Check One GPM	Units Check One CFS	DRAWDOWN (ft)	TIME PUMPED (hrs & min)
	AIR LIFT	1000	X		155	9 hrs

Pump (Permanent)

Pump Description: 8" 8TTS-550 6STG Horsepower: 75 Pump Intake Depth: 740 feet

Approximate Maximum Pumping Rate: 550 GPM Well Disinfected upon Completion? ☒Yes ☐No

Comments

Description of construction activity, additional materials used, problems encountered, extraordinary Circumstances, abandonment procedures. *Use additional well data form for more space.*

Well Driller Statement

This well was drilled and constructed under my supervision, according to applicable rules and regulations, and this report is complete and correct to the best of my knowledge and belief.

Name GRIMSHAW DRILLING (Person, Firm, or Corporation - Print or Type) License No. 240

Signature _____ (Licensed Well Driller) Date 5-14-12

MW-1

(51)

Centurion Mines Corporation
Reverse Circulation Drill Log

WATER MONITORING WELL LOCATED ON PEDIMENT 625' EAST OF SECTION LINE 12 & 1500' S OF SECTION LINE 6

Project OK MINE Hole No. COK-96-51 Date Drilled 5/15/96-5/16/96 Drill Co. CMC

Northing _____ Easting _____ Town T27S Range R11W Sec 7

T.D. 445' Ang/Bear -90° Collar Elev. 5820' Scale: 1"=40'

State/Cty: MILFORD, UT Date Logged 5/15/96 Logger PAUL WISNIEWSKI

Interval	Graphic Log	Rock Description	Alteration: ALLUVIUM	CHLOR	SERIC	CLAY	FE OX	Assay Values: Cu
20		TRACE MALACHITE IN ALLUVIUM						
40								
60		QZ VEINED IRON OXIDIZED QZ MONZONITE						
80		RED-BROWN CLAY AND RED-BROWN IRON OXIDATION						
100		CONTAMINATED SAMPLE						
120		HEMATITE ALONG FRACTURES						
140								
160		HEMATITE CHUNKS IN QZ MONZONITE						
180								
200								
220		DISSEMINATED ORIENT RED HEMATITE IN MODERATELY CHLORITIZED QZ MONZONITE						
240		220'-270' CHRYSOCOLLA ON HEMATITE, DISSEMINATED SULFIDES AND OTHER IRON OXIDES, EPIDOTE						
260		FELSIC DOMINATED QZ MONZONITE						
280		SIGNIFICANT BIOTITE BUT LITTLE						
300		AMPHIBOLE - BIOTITE IS UNALTERED						

Centurion Mines Corporation
Reverse Circulation Drill Log

Project OK MINE Hole No. COK-96-51 Date Drilled 5/15/96 - 5/16/96 Drill Co. CMC

Northing _____ Easting _____ Town T27S Range R11W Sec 7

T.D. 445' Ang./Bear -90° Collar Elev. 5820' Scale: 1"=40'

State/Cty: MILFORD, UT Date Logged 5/16/96 Logger PAUL WISNIEWSKI

Interval	Graphic Log	Rock Description	Alteration: CHAL	CHLOR	SERI	CLAY	CUOX	FeOx	Assay Values: Cu
320		DISSEMINATED RED BROWN HEMATITE STAINED Qz MONZONITE SECONDARY CALCITE AND TRACE							
340		CHALCOPYRITE, MINOR Qz VEINS IRON OXIDATION LOCALIZED AROUND							
360		BIOTITE GRAINS, TRACE CHRYSOCOLLA 320'-330'; 400'-410'							
380		335' BEGINS SILICIFIED Qz MONZ. WITH OPEN CAVITIES AND Qz KTL							
400		DEVELOPMENT, Qz IS MILKY TO CHERT-LIKE (BROWNISH-TAN							
420		WITH CONCHOIDAL FRACTURING EVIDENT); 426' SLIGHTLY OXIDIZED							
440		Qz MONZONITE, DISTINCT XTL							
460		BOUNDARIES, WELL-DEVELOPED CRYSTALS OF AMPHIBOLE AND							
480		BIOTITE (SUBHEDRAL TO ANHEDRAL)							
500									

Appendix F
ITDF Test Pit and Core Logs

DATE
STARTED: 3/7/13
COMPLETED: 3/7/13
BACKFILLED: 3/7/13

Geotechnical Investigation

Milford, UT

Project Number 01640-002

IGES Rep: NB

Rig Type: Backhoe

TEST PIT NO:

TP-02

Sheet 1 of 1

LOCATION

NORTHING EASTING ELEVATION

DEPTH METERS	DEPTH FEET	SAMPLES	WATER LEVEL	GRAPHICAL LOG	UNIFIED SOIL CLASSIFICATION	MATERIAL DESCRIPTION	Dry Density(pcf)	Moisture Content %	Percent minus 200	Liquid Limit	Plasticity Index
0	0				SM	Silty SAND - loose, dry, light brown, sand is fine					
						Silty SAND - loose to medium dense, dry, light brown, sand is fine			15.4		
1											
5											
2					SW	Well Graded SAND - medium dense, dry, grey to brown			5.8		
						Bottom of Test Pit @ 8 Feet					
3	10										

Moisture Content and Atterberg Limits

Plastic Limit | Moisture Content | Liquid Limit

10 20 30 40 50 60 70 80 90

LOG O TEST PITS (SIMPLIFIED) 01640-002.GPJ IGES.GDT 5/10/13

IGES

SAMPLE TYPE
- GRAB SAMPLE
- 3" O.D. THIN-WALLED HAND SAMPLER

WATER LEVEL
- MEASURED
- ESTIMATED

NOTES:

Plate

A-2

DATE
STARTED: 3/26/13
COMPLETED: 3/26/13
BACKFILLED: 3/26/13

Geotechnical Investigation

Milford, UT

Project Number 01640-002

IGES Rep: JFW

Rig Type: Backhoe

TEST PIT NO:

TP-21

Sheet 1 of 1

LOCATION

NORTHING 4,261,358. EASTING 314,793. ELEVATION

DEPTH METERS	DEPTH FEET	SAMPLES	WATER LEVEL	GRAPHICAL LOG	UNIFIED SOIL CLASSIFICATION	MATERIAL DESCRIPTION	Dry Density(pcf)	Moisture Content %	Percent minus 200	Liquid Limit	Plasticity Index	Moisture Content and Atterberg Limits (Plastic Limit / Moisture Content / Liquid Limit)
0	0					TOPSOIL - SILT to SAND - dark brown, sand is fine						
					SP-SM	Poorly Graded SAND with some silt - brown, sand is fine to medium						
1												
	5				SP	Poorly Graded SAND - brown, medium to coarse sand, some silt, some gravel, decomposed granidiorite						
2						Bottom of Test Pit @ 6 Feet						
3	10											

Moisture Content and Atterberg Limits: 10 20 30 40 50 60 70 80 90

LOG O TEST PITS (SIMPLIFIED) 01640-002.GPJ IGES.GDT 5/10/13

IGES

SAMPLE TYPE
- GRAB SAMPLE
- 3" O.D. THIN-WALLED HAND SAMPLER

WATER LEVEL
- MEASURED
- ESTIMATED

NOTES:

Plate

A-2

DATE
STARTED: 3/26/13
COMPLETED: 3/26/13
BACKFILLED: 3/26/13

Geotechnical Investigation

Milford, UT

Project Number 01640-002

IGES Rep: JFW

Rig Type: Backhoe

TEST PIT NO: TP-22

Sheet 1 of 1

LOCATION

NORTHING 4,261,377. EASTING 314,771. ELEVATION

DEPTH METERS	DEPTH FEET	SAMPLES	WATER LEVEL	GRAPHICAL LOG	UNIFIED SOIL CLASSIFICATION	MATERIAL DESCRIPTION	Dry Density(pcf)	Moisture Content %	Percent minus 200	Liquid Limit	Plasticity Index	Moisture Content and Atterberg Limits (Plastic Limit – Moisture Content – Liquid Limit)
0	0					TOPSOIL						
					SM	Silty SAND - medium dense, brown, sand is fine						
1												
	5				SP	Poorly Graded SAND - brown, transitioning into decomposed granidiorite - hard, less weathered, grading to gravel						
2						Bottom of Test Pit @ 6 Feet						
3	10											

Moisture Content and Atterberg Limits: 10 20 30 40 50 60 70 80 90

LOG O TEST PITS (SIMPLIFIED) 01640-002.GPJ IGES.GDT 5/10/13

IGES

SAMPLE TYPE
- GRAB SAMPLE
- 3" O.D. THIN-WALLED HAND SAMPLER

WATER LEVEL
- MEASURED
- ESTIMATED

NOTES:

Plate A-3

DATE
STARTED: 3/26/13
COMPLETED: 3/26/13
BACKFILLED: 3/26/13

Geotechnical Investigation

Milford, UT

Project Number 01640-002

IGES Rep: JFW

Rig Type: Backhoe

TEST PIT NO:

TP-23

Sheet 1 of 1

LOCATION

NORTHING 4,261,348. EASTING 314,933. ELEVATION

DEPTH METERS	DEPTH FEET	SAMPLES	WATER LEVEL	GRAPHICAL LOG	UNIFIED SOIL CLASSIFICATION	MATERIAL DESCRIPTION	Dry Density(pcf)	Moisture Content %	Percent minus 200	Liquid Limit	Plasticity Index	Moisture Content and Atterberg Limits (Plastic Limit / Moisture Content / Liquid Limit)
0	0					TOPSOIL - SILT to Silty SAND						
						Weathered GRANIDIORITE - grey, hard, fractured, somewhat weathered						
						Bottom of Test Pit @ 2.5 Feet						
1												
	5											
2												
3	10											

Moisture Content and Atterberg Limits

Plastic Limit / Moisture Content / Liquid Limit

10 20 30 40 50 60 70 80 90

LOG O TEST PITS (SIMPLIFIED) 01640-002.GPJ IGES.GDT 5/10/13

IGES

SAMPLE TYPE
- GRAB SAMPLE
- 3" O.D. THIN-WALLED HAND SAMPLER

WATER LEVEL
- MEASURED
- ESTIMATED

NOTES:

Plate

A-4

DATE
STARTED: 3/26/13
COMPLETED: 3/26/13
BACKFILLED: 3/26/13

Geotechnical Investigation

Milford, UT

Project Number 01640-002

IGES Rep: JFW

Rig Type: Backhoe

TEST PIT NO:

TP-24

Sheet 1 of 1

LOCATION

NORTHING 4,261,366. EASTING 314,896. ELEVATION

DEPTH METERS	DEPTH FEET	SAMPLES	WATER LEVEL	GRAPHICAL LOG	UNIFIED SOIL CLASSIFICATION	MATERIAL DESCRIPTION	Dry Density(pcf)	Moisture Content %	Percent minus 200	Liquid Limit	Plasticity Index	Moisture Content and Atterberg Limits (Plastic Limit / Moisture Content / Liquid Limit)
0	0					TOPSOIL						
					SM	Silty SAND - medium dense, brown, fine to medium sand						
1					SP-SM	Poorly Graded SAND with some silt - dense, grey brown, decomposed granidiorite						
	5					- grading to harder granidiorite, but still crushes in hand						
2						- difficult digging						
						Bottom of Test Pit @ 6 Feet						
3	10											

Moisture Content and Atterberg Limits

Plastic Limit | Moisture Content | Liquid Limit

10 20 30 40 50 60 70 80 90

LOG O TEST PITS (SIMPLIFIED) 01640-002.GPJ IGES.GDT 5/10/13

IGES

SAMPLE TYPE
- GRAB SAMPLE
- 3" O.D. THIN-WALLED HAND SAMPLER

WATER LEVEL
- MEASURED
- ESTIMATED

NOTES:

Plate

A-5

DATE
STARTED: 3/26/13
COMPLETED: 3/26/13
BACKFILLED: 3/26/13

Geotechnical Investigation

Milford, UT

Project Number 01640-002

IGES Rep: JFW

Rig Type: Backhoe

TEST PIT NO:

TP-25

Sheet 1 of 1

LOCATION

NORTHING 4,261,568. EASTING 314,933. ELEVATION

DEPTH METERS	DEPTH FEET	SAMPLES	WATER LEVEL	GRAPHICAL LOG	UNIFIED SOIL CLASSIFICATION	MATERIAL DESCRIPTION	Dry Density(pcf)	Moisture Content %	Percent minus 200	Liquid Limit	Plasticity Index	Moisture Content and Atterberg Limits (Plastic Limit / Moisture Content / Liquid Limit)
0	0					TOPSOIL						
					SM	Silty SAND - brown, fine to medium sand						
1						Silty SAND - grading to grey brown, weathered granidiorite						
	5					- hard digging Bottom of Test Pit @ 5 Feet						
2												
3	10											

10 20 30 40 50 60 70 80 90

LOG O TEST PITS (SIMPLIFIED) 01640-002.GPJ IGES.GDT 5/10/13

IGES

SAMPLE TYPE
- GRAB SAMPLE
- 3" O.D. THIN-WALLED HAND SAMPLER

WATER LEVEL
- MEASURED
- ESTIMATED

NOTES:

Plate

A-6

DATE
STARTED: 3/26/13
COMPLETED: 3/26/13
BACKFILLED: 3/26/13

Geotechnical Investigation

Milford, UT

Project Number 01640-002

IGES Rep: JFW

Rig Type: Backhoe

TEST PIT NO:

TP-26

Sheet 1 of 1

LOCATION

NORTHING 4,261,551. EASTING 314,875. ELEVATION

DEPTH METERS	DEPTH FEET	SAMPLES	WATER LEVEL	GRAPHICAL LOG	UNIFIED SOIL CLASSIFICATION	MATERIAL DESCRIPTION	Dry Density(pcf)	Moisture Content %	Percent minus 200	Liquid Limit	Plasticity Index	Moisture Content and Atterberg Limits (Plastic Limit / Moisture Content / Liquid Limit)
0	0				ML	TOPSOIL						
					ML-SM	SILT to Silty SAND - brown, sand is fine, micaceous						
1												
	5					- grading to more sand						
2												
3	10					BEDROCK - Quartz Monzonite - grading to brown highly weathered bedrock, fine grained - hard rock Bottom of Test Pit @ 10 Feet						

Moisture Content and Atterberg Limits: 10 20 30 40 50 60 70 80 90

LOG O TEST PITS (SIMPLIFIED) 01640-002.GPJ IGES.GDT 5/10/13

IGES

SAMPLE TYPE
- GRAB SAMPLE
- 3" O.D. THIN-WALLED HAND SAMPLER

WATER LEVEL
- MEASURED
- ESTIMATED

NOTES:

Plate

A-7

DATE
STARTED: 3/26/13
COMPLETED: 3/26/13
BACKFILLED: 3/26/13

Geotechnical Investigation

Milford, UT

Project Number 01640-002

IGES Rep: JFW

Rig Type: Backhoe

TEST PIT NO:

TP-27

Sheet 1 of 1

LOCATION

NORTHING 4,261,553. EASTING 314,962. ELEVATION

DEPTH METERS	DEPTH FEET	SAMPLES	WATER LEVEL	GRAPHICAL LOG	UNIFIED SOIL CLASSIFICATION	MATERIAL DESCRIPTION	Dry Density(pcf)	Moisture Content %	Percent minus 200	Liquid Limit	Plasticity Index	Moisture Content and Atterberg Limits (Plastic Limit / Moisture Content / Liquid Limit)
0	0					TOPSOIL						
					SM	Silty SAND - brown, fine sand						
						Weathered Granidiorite - grey, coarse grained, more quartz						
1						Bottom of Test Pit @ 3.5 Feet						
	5											
2												
3	10											

Moisture Content and Atterberg Limits: 10 20 30 40 50 60 70 80 90

IGES

SAMPLE TYPE
- GRAB SAMPLE
- 3" O.D. THIN-WALLED HAND SAMPLER

WATER LEVEL
- MEASURED
- ESTIMATED

NOTES:

Plate

A-8

LOG O TEST PITS (SIMPLIFIED) 01640-002.GPJ IGES.GDT 5/10/13

DATE
STARTED: 3/26/13
COMPLETED: 3/26/13
BACKFILLED: 3/26/13

Geotechnical Investigation

Milford, UT

Project Number 01640-002

IGES Rep: JFW

Rig Type: Backhoe

TEST PIT NO:

TP-28 Borrow

Sheet 1 of 1

LOCATION

NORTHING 4,261,091. EASTING 314,978. ELEVATION

DEPTH METERS	DEPTH FEET	SAMPLES	WATER LEVEL	GRAPHICAL LOG	UNIFIED SOIL CLASSIFICATION	MATERIAL DESCRIPTION	Dry Density(pcf)	Moisture Content %	Percent minus 200	Liquid Limit	Plasticity Index	Moisture Content and Atterberg Limits (Plastic Limit / Moisture Content / Liquid Limit)
0	0				ML	Sandy SILT - TOPSOIL - loose, dark brown						10 20 30 40 50 60 70 80 90
					SM	Silty SAND - brown, sand is fine, decomposed bedrock						
1					SP-SM	Weathered Granidiorite - grey						
						Bottom of Test Pit @ 3.5 Feet						
	5											
2												
3	10											

LOG O TEST PITS (SIMPLIFIED) 01640-002.GPJ IGES.GDT 5/10/13

IGES

SAMPLE TYPE
- GRAB SAMPLE
- 3" O.D. THIN-WALLED HAND SAMPLER

WATER LEVEL
- MEASURED
- ESTIMATED

NOTES:

Plate

A-9

DATE
STARTED: 3/26/13
COMPLETED: 3/26/13
BACKFILLED: 3/26/13

Geotechnical Investigation

Milford, UT

Project Number 01640-002

IGES Rep: JFW

Rig Type: Backhoe

TEST PIT NO:

TP-29

Sheet 1 of 1

LOCATION

NORTHING 4,261,138. EASTING 314,984. ELEVATION

DEPTH METERS	DEPTH FEET	SAMPLES	WATER LEVEL	GRAPHICAL LOG	UNIFIED SOIL CLASSIFICATION	MATERIAL DESCRIPTION	Dry Density(pcf)	Moisture Content %	Percent minus 200	Liquid Limit	Plasticity Index	Moisture Content and Atterberg Limits (Plastic Limit / Moisture Content / Liquid Limit)
0	0				ML	TOPSOIL						
					SM	Silty SAND - brown, sand is fine, dense						
1												
	5					- Bedrock						
						Bottom of Test Pit @ 5.5 Feet						
2												
3	10											

Moisture Content and Atterberg Limits: 10 20 30 40 50 60 70 80 90

IGES

SAMPLE TYPE
- GRAB SAMPLE
- 3" O.D. THIN-WALLED HAND SAMPLER

WATER LEVEL
- MEASURED
- ESTIMATED

NOTES:

Plate

A-10

LOG O TEST PITS (SIMPLIFIED) 01640-002.GPJ IGES.GDT 5/10/13

PROJECT:

ROCK CORE LOG

BORING NO. ITDF-10e	PROJECT NO.	LOCATION CSMine Tailing Dam	SHEET 1 OF 10
TIME START	DRILLING CONTRACTOR	DRILLING EQUIPMENT	DATE 12/27/2013
TIME STOP	DRILLER	DRILLING METHOD	SAMPLING METHOD
TOTAL DEPTH 200	BACKFILL MATERIAL	WATER FIRST ENCOUNTERED	FINAL DEPTH TO WATER

DEPTH (FT)	CORE RUN (#)	RECOV. CORE LENGTH (ft)	TOTAL CORE RECOVERY (%)	SOLID CORE RECOVERY (%)	RQD (%)	FRCT. DENSITY (# PER FT)	PENETRATION RATE (FT/HR)	SMPL FOR TEST	GRAPHIC LOG	DESCRIPTION/LITHOLOGY/COMMENTS
1									QAL	Red Clay till 15'
2										
3										
4										
5										
6										Alluvium
7										
8	8	2	25		10%					
9										
0										
1										
2										
3										
4										
5	7	1	14		0%					
6										
7										
8										Altered /Weathering Zone
9										

LOGGED BY: _____ OFFICE: _____ DATE _____

PROJECT: ROCK CORE LOG

BORING NO.	PROJECT NO.	LOCATION	SHEET 2 OF 10
TIME START	DRILLING CONTRACTOR	DRILLING EQUIPMENT	DATE
TIME STOP	DRILLER	DRILLING METHOD	SAMPLING METHOD
TOTAL DEPTH	BACKFILL MATERIAL	WATER FIRST ENCOUNTERED	FINAL DEPTH TO WATER

DEPTH (FT)	CORE RUN (IN)	RECOV. CORE LENGTH (IN)	TOTAL CORE RECOVERY (%)	SOLID CORE RECOVERY (%)	RQD (%)	FRCT. DENSITY (# PER FT)	PENETRATION RATE (FT/HR)	SAMPL. FOR (TESTS)	GRAPHIC LOG	DESCRIPTION/LITHOLOGY/COMMENTS
20										
1	↑									Altered Zone Granite
2	QAL									
3										Solid core starts
4										Granodiorite
5	126	60	48		27%					
6										
7										
8										Clay
9	48	36	75	14	21%					dendritic black crystals magenes
30										
1										
2	36	49	136		0%					Some clay in cracks
3										- drillers said nothing of water
4										
5	36	55	152	58	26%					
6										
7										Mica Clay - Brown
8										
9	42	36	86		26%					

LOGGED BY: ______ OFFICE: ______ DATE: ______

PROJECT:

ROCK CORE LOG

BORING NO.	PROJECT NO.	LOCATION	SHEET 3 OF 10
TIME START	DRILLING CONTRACTOR	DRILLING EQUIPMENT	DATE
TIME STOP	DRILLER	DRILLING METHOD	SAMPLING METHOD
TOTAL DEPTH	BACKFILL MATERIAL	WATER FIRST ENCOUNTERED	FINAL DEPTH TO WATER

DEPTH (FT)	CORE RUN (ft)	RETURN CORE LENGTH (ft)	TOTAL CORE RECOVERY (%)	SOLID CORE RECOVERY (%)	RQD (%)	FRACTURE DENSITY (FRACT/FT)	PENETRATION RATE (ft/hr)	SAMPLE/CORE TEST	GRAPHIC LOG	DESCRIPTION/METHOD/COMMENTS
1										
2	42	41	114		20%					
3										
4										
5										
6										
7										
8	66	69	105		58%					
9										
0										
1										
2										
3										
4										
5	90	90	100		40%					
6										
7										
8										
9										

LOGGED BY: _____ OFFICE: _____ DATE: _____

PROJECT:

ROCK CORE LOG

BORING NO.	PROJECT NO.	LOCATION	SHEET 4 OF [illegible]
TIME START	DRILLING CONTRACTOR	DRILLING EQUIPMENT	DATE
TIME STOP	DRILLER	DRILLING METHOD / SAMPLING METHOD	
TOTAL DEPTH	BACKFILL MATERIAL	WATER FIRST ENCOUNTERD / FINAL DEPTH TO WATER	

DEPTH (FT)	CORE RUN (FT)	RECOV CORE LENGTH (FT)	TOTAL CORE RECOVERY (%)	SOLID CORE RECOVERY (%)	RQD (%)	FRCT. DENSITY (FT/FT)	PENETRATION RATE (FT/HR)	SAMPLE TOR TEST	GRAPHIC LOG	DESCRIPTION/LITHOLOGY/COMMENTS
1										
2	78	[illegible]	[illegible]		44%					
3										
4										
5										
6										
7	[illegible]	84	[illegible]		33%					
8										
9										
0										
1										
2										
3										
4	78	84	[illegible]		70%	1.6				
5										
6										
7										
8	[illegible]	[illegible]	[illegible]		38%	2				
9										

LOGGED BY: _____ OFFICE: _____ DATE: _____

PROJECT:

ROCK CORE LOG

BORING NO.	PROJECT NO.	LOCATION	SHEET 5 OF 10
TIME START	DRILLING CONTRACTOR	DRILLING EQUIPMENT	DATE
TIME STOP	DRILLER	DRILLING METHOD / SAMPLING METHOD	
TOTAL DEPTH	BACKFILL MATERIAL	WATER FIRST ENCOUNTERED / FINAL DEPTH TO WATER	

DEPTH (FT)	CORE RUN (ft)	RECOV. CORE LENGTH (ft)	TOTAL CORE RECOVERY (%)	SOLID CORE RECOVERY (%)	RQD (%)	FRACT. DENSITY (# PER FT)	PENETRATION RATE (FT/HR)	SAMPL. FOR TEST	GRAPHIC LOG	DESCRIPTION/LITHOLOGY/COMMENTS
80	3.0	2.0	10			8				
1										
2										
3										
4										
5										
6										
7										
8		7.9	8.2							
9										Mica clay is green in color
90										
1										
2	3	4.2	14.2	4.2		2.1				
3										
4										
5	4.2	4.2	14.2							
6				0						
7										
8	2.0	4.2	14.2							
9					9.2					

LOGGED BY: _____ OFFICE: _____ DATE: _____

PROJECT:

ROCK CORE LOG

BORING NO.	PROJECT NO.	LOCATION	SHEET
			6 OF 10
TIME START	DRILLING CONTRACTOR	DRILLING EQUIPMENT	DATE
TIME STOP	DRILLER	DRILLING METHOD / SAMPLING METHOD	
TOTAL DEPTH	BACKFILL MATERIAL	WATER FIRST ENCOUNTERED / FINAL DEPTH TO WATER	

DEPTH (FT)	CORE RUN (IN)	RECOV. CORE LENGTH (IN)	TOTAL CORE RECOVERY (%)	SOLID CORE RECOVERY (%)	RQD (%)	FRCT. DENSITY (# PER FT)	PENETRATION RATE (T/HR)	SAMPL. FOR TEST	GRAPHIC LOG	DESCRIPTION/LITHOLOGY/COMMENTS
1	30	9	30							
2										
3										
4										
5										Much more dendritic Manganese
6	60	57	95		35%	12				
7										
8										
9										
10										
1	60	59	105		68%	2				
2						212				
3										
4										
5										
6										
7	60	28	103							
8										
9						23				
10										

LOGGED BY: _____ OFFICE: _____ DATE: _____

PROJECT:

ROCK CORE LOG

BORING NO.	PROJECT NO.	LOCATION	SHEET 7 OF 10
TIME START	DRILLING CONTRACTOR	DRILLING EQUIPMENT	DATE
TIME STOP	DRILLER	DRILLING METHOD / SAMPLING METHOD	
TOTAL DEPTH	BACKFILL MATERIAL	WATER FIRST ENCOUNTERED / FINAL DEPTH TO WATER	

DEPTH (FT)	CORE RUN (FT)	RECOV. CORE LENGTH (IN)	TOTAL CORE RECOVERY (%)	SOLID CORE RECOVERY (%)	RQD (%)	FRCT. DENSITY (# PER FT)	PENETRATION RATE (MIN)	SAMPLE OR TEST	GRAPHIC LOG	DESCRIPTION/LITHOLOGY/COMMENTS
1	4.2	42	100			9.5				
2										
3										
4										
5										
6	4.6	72	100		76%					
7	5.0	48	96		67%					
8										Clay [illegible]
9										
10										
1										
2										
3										
4										
5										
6										
7										
8	4.6	38	110	6	13%					
9										

LOGGED BY: _____ OFFICE: _____ DATE: _____

PROJECT:

ROCK CORE LOG

BORING NO.	PROJECT NO.	LOCATION	SHEET 8 OF 20
TIME START	DRILLING CONTRACTOR	DRILLING EQUIPMENT	DATE
TIME STOP	DRILLER	DRILLING METHOD	SAMPLING METHOD
TOTAL DEPTH	BACKFILL MATERIAL	WATER FIRST ENCOUNTERED	FINAL DEPTH TO WATER

DEPTH (FT)	CORE RUN (IN)	RECOV. CORE LENGTH (IN)	TOTAL CORE RECOVERY (%)	SOLID CORE RECOVERY (%)	RQD (%)	FRCT. DENSITY (# PER FT)	PENETRATION RATE (FT/HR)	SMPL. FOR TEST	GRAPHIC LOG	DESCRIPTION/LITHOLOGY/COMMENTS
1										
2										
3				40		>12				
4										
5										
6						2				
7										
8	18.3	[illegible]	104		19%					[illegible]
9				0						
10						>12				
1										
2										
3	60	54	[illegible]		53					
4										
5										
6										
7										
8	60	66	[illegible]	39	50	4.9				
9										

LOGGED BY: ______________________ OFFICE: ______________ DATE: ______________

PROJECT:

ROCK CORE LOG

BORING NO.	PROJECT NO.	LOCATION	SHEET OF
TIME START	DRILLING CONTRACTOR	DRILLING EQUIPMENT	DATE
TIME STOP	DRILLER	DRILLING METHOD / SAMPLING METHOD	
TOTAL DEPTH	BACKFILL MATERIAL	WATER FIRST ENCOUNTERED / FINAL DEPTH TO WATER	

DEPTH (FT)	CORE RUN (IN)	RECOV. CORE LENGTH (IN)	TOTAL CORE RECOVERY (%)	SOLID CORE RECOVERY (%)	RQD (%)	FRCT. DENSITY (# BLS/FT)	PENETRATION RATE: (1 FT/HR)	SAMPL. FOR TEST	GRAPHIC LOG	DESCRIPTION/LITHOLOGY/COMMENTS
1	36	34			22%					
2										
3				0		20				
4										
5	60	55			12.5					
6										
7										
8										
9										
10	60	56			22%					
1						5.7				
2										
3				27						
4										
5	60	28			45%					
6	18	14			22%					
7										
8										
9	30	34	13	5	12					

LOGGED BY: _____ OFFICE: _____ DATE: _____

PROJECT:

ROCK CORE LOG

BORING NO.	PROJECT NO.	LOCATION	SHEET 10 OF 10
TIME START	DRILLING CONTRACTOR	DRILLING EQUIPMENT	DATE
TIME STOP	DRILLER	DRILLING METHOD / SAMPLING METHOD	
TOTAL DEPTH	BACKFILL MATERIAL	WATER FIRST ENCOUNTERED / FINAL DEPTH TO WATER	

DEPTH (FT)	CORE RUN (IN)	RECOV. CORE LENGTH (IN)	TOTAL CORE RECOVERY (%)	SOLID CORE RECOVERY (%)	RQD (%)	FRCT. DENSITY (# PER FT)	PENETRATION RATE (T/IN)	SMPL. / LOG TEST	GRAPHIC LOG	DESCRIPTION, LITHOLOGY/COMMENTS
1										
2										
3										
4	60	78		40	53%					
5	12	19	24		0	9	2			
6										
7										
8										
9	72	41	78		21					
10										
1										
2	42	42	100		33					
3										
4	18	14			28					
5										
6										
7	6	56	156		44					
8										
9										
20	24	36	150	42	0	12	31	1		End of Hole

LOGGED BY: _____ OFFICE: _____ DATE: _____

Appendix G
Seismic Survey Report
Dam Location

SAGE EARTH SCIENCE

December 19, 2013

RE: SEISMIC REFRACTION SURVEY – DEPTH TO ROCK/RIPPABILITY – CS MINE TAILINGS POND - DAM LOCATION

Based on the project objective and site conditions, Sage Earth Science conducted a seismic refraction tomography survey to map the depth to rock and determine overburden and refractor velocity at the Southern Utah site.

P-wave survey (refraction)

Given a physical setting of increasing density with depth, and by measuring the travel time of a compression wave (*p-wave*) between known points, the seismic refraction method can be used to determine the depth to a refracting horizon(s), the seismic velocity of the refracting horizon(s), as well as thickness and velocities of the overlying materials.

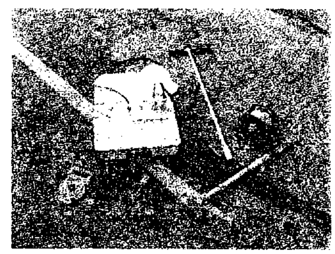


Figure 1. field equipment

Approximately 1,820 feet p-wave refraction profile were acquired. Profiles were located at the site as directed by the customer. Data were acquired in accordance with ASTM standard, **ASTM D 5777-00** *Standard Guide for Using the Seismic Refraction Method for Subsurface Investigation.* Data were reduced using PlotRefra™ seismic refraction tomographic inversion software produced by Geometrics Inc.

Sage Earth Science used a 24-channel engineering seismograph, 600 pound weight drop and 16 lb. sledgehammer to perform the acoustic travel time measurements. Data are collected in 375 foot arrays with 24 geophones, one placed every 16.4 feet along profile. Six records for each 24 channel array were obtained.

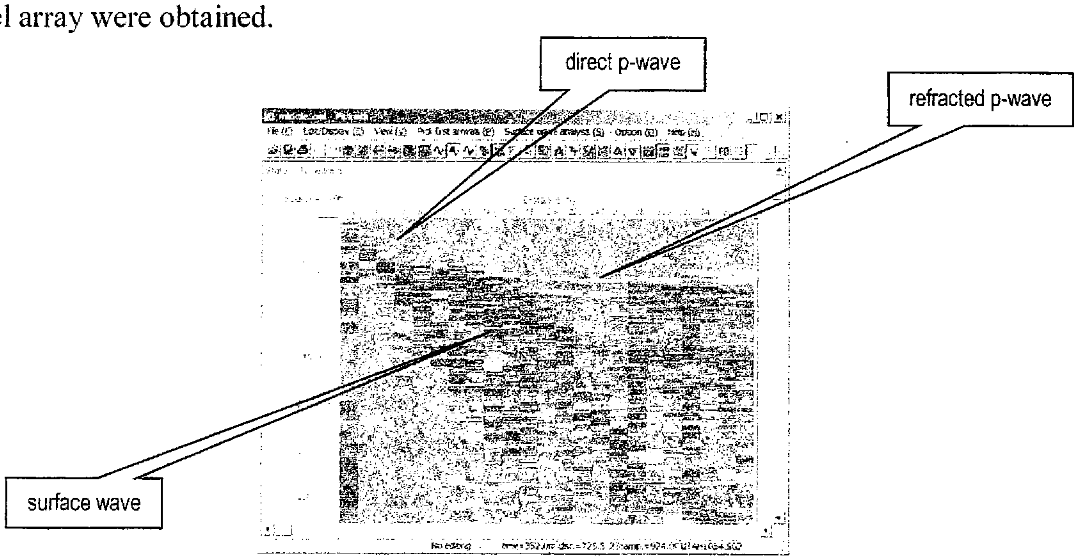


Figure #2 Typical field record

sageearthscience@yahoo.com

Table 1 Seismic Survey recording parameters

recording instrument	Bison 9024 s/n 6-93913
geophone	Mark products – 4.5 hz. vertical
Geophone/station spacing	16.4 feet (5 meters)
number of channels	24
spread length	377 feet
sample rate	0.25 millisecond
number of samples/channel	8000
record length	2.0 seconds
low pass filter	120 Hz.
low cut filter	4 Hz.
seismic source	16 pound sledge hammer, 600 lb weight drop
source locations	Channels 1,5,10,15,20,24
P-wave refraction	Tomographic inversion PlotRefra™

Profile locations were field located as directed by the customer. Approximate locations are shown in figure 3. Elevation data were obtained from Google Earth and should be considered approximate.

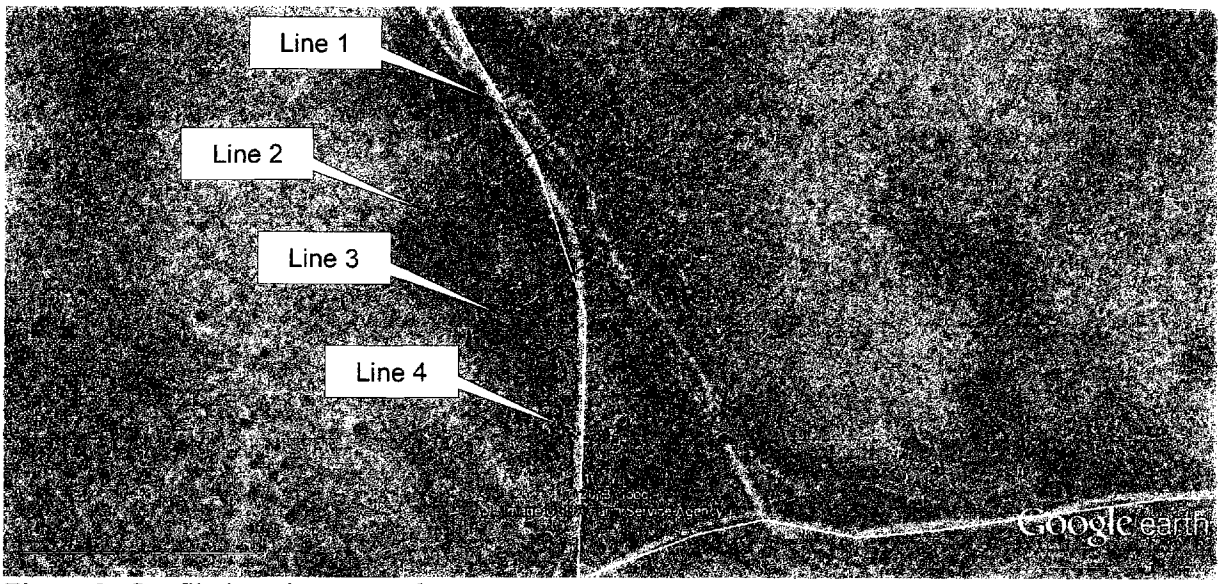


Figure 3. Profile locations. *(scale and locations approximate)*

Discussion

The following figures show the compression wave velocity profiles at the locations show in figure 3. The site is characterized by four general velocity zones. The characterization of materials is based on typical velocities of materials and should be correlated with test pits, borings, or other direct observations.

The first velocity zone is a low velocity material exhibiting a velocity below 1,500 feet per second. This material is a low density sediment or unconsolidated weathered material. These materials are shown as blue in the profile figures.

A mid-range velocity zone 1,500 fps - 4,000 fps is likely a heavily weathered or highly fractured rock material or sediment. These materials are shown as green-yellow in the profile figures.

A mid-range velocity zone 4,000 fps - 6,000 fps is likely a heavily weathered or highly fractured rock material. These materials are shown as yellow-orange in the profile figures.

Red-maroon in the profile figures should be considered rock material.

The velocities observed across the site are generally low. According to the Caterpillar Handbook for Ripping, seismic velocities are but one aspect of a rippablity survey and should be used in conjunction with other tests, observations, and experience.

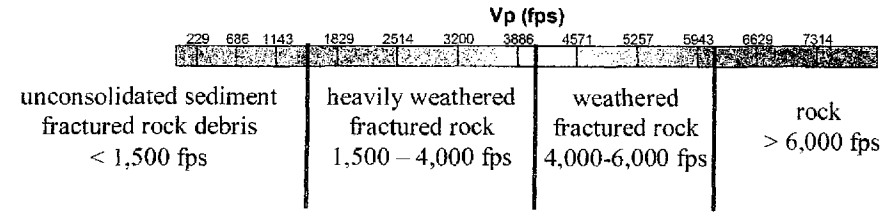


Figure #4 General velocity range of materials

Distances and depths are measured in feet. Velocities are reported in feet per second. Profile distances is the distance south or east within each profile depending on the profile orientation.

As a general guide, quoting from the ASTM standard, **ASTM D 5777-00** *Standard Guide for Using the Seismic Refraction Method for Subsurface Investigation*

> *The seismic refraction method provides the velocity of compressional P-waves in subsurface materials. Although the P-wave velocity can be a good indicator of the type of soil or rock, it is not a unique indicator. Table 2 shows that each type of sediment or rock has a wide range of seismic velocities, and many of these ranges significantly overlap. While the seismic refraction technique measures the seismic velocity of seismic waves in earth materials, it is the interpreter who based on knowledge of the local conditions or other data, or both, must interpret the seismic refraction data and arrive at a geologically reasonable solution*

Table 2

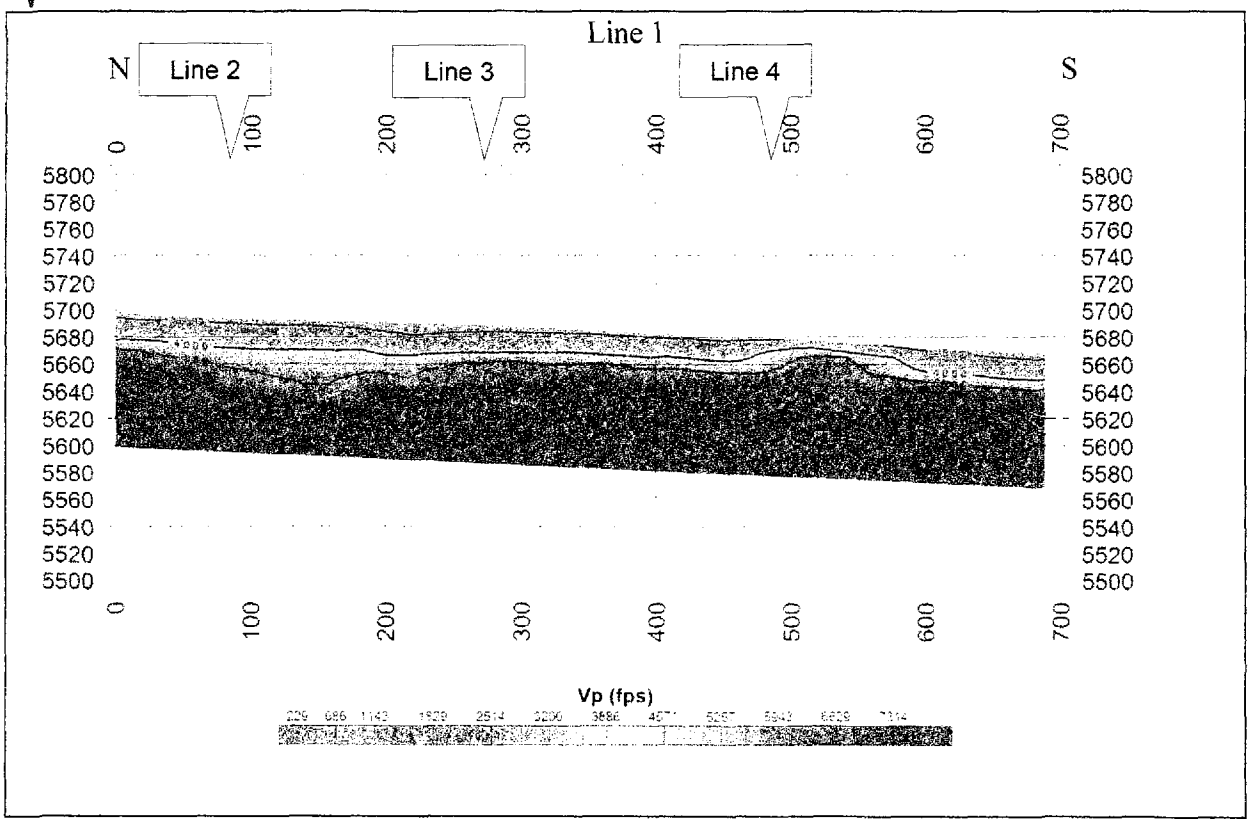
Material	***wave velocity Vp feet/second***	***wave velocity Vp meters/second***
Weathered surface material	*800-2,000*	*250-600*
Gravel or dry sand	*1,500-3,000*	*460-900*

Sand (saturated)	*4,000-6,000*	*1,200-1,800*
Clay (saturated)	*3,000-9,000*	*900-2,700*
Sandstone	*6,000-13,000*	*1,800-4,000*
Shale	*9,000-14,000*	*2,700-4,300*
Chalk	*6,000-13,000*	*1,800-4,000*
Limestone	*7,000-20,000*	*2,100-6,100*
Granite	*15,000-19,000*	*4,600-5,800*
Metamorphic rock	*10,000-23,000*	*3,000-7,000*

5.2.2. According to Mooney (8), P-wave velocities are generally greater for:

1. *Denser rocks than lighter rocks*
2. *Older rocks than younger rocks*
3. *Igneous rocks than sedimentary rocks*
4. *Solid rocks than rocks with crack and fractures*
5. *Unweathered rocks than weathered rocks*
6. *Consolidated sediments than unconsolidated sediments*
7. *Water saturated rocks/sediments than unsaturated rocks/sediments*
8. *Wet soils than dry soils*

Glen Carpenter / principal


Line 1
N
Line 2
Line 3
Line 4
S
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100
200
300
400
500
600
700
5800
5780
5760
5740
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5700
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5600
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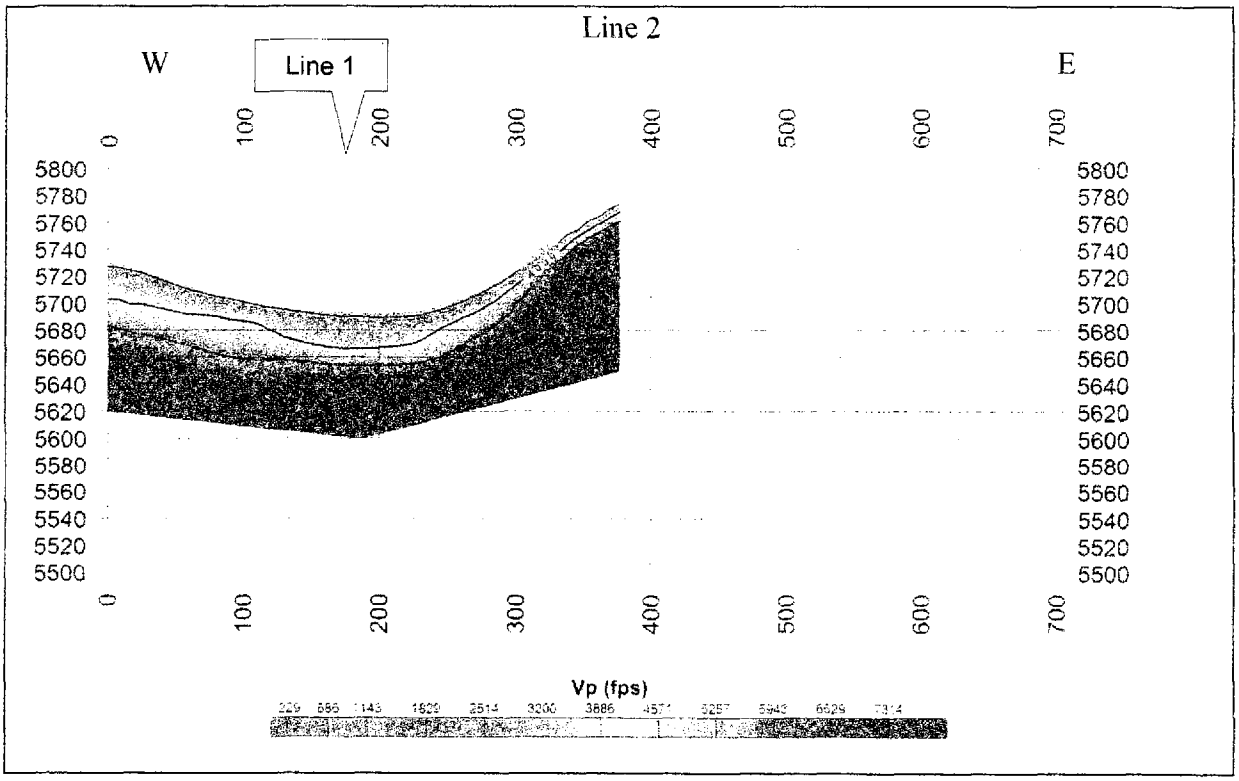
5520
5500
Vp (fps)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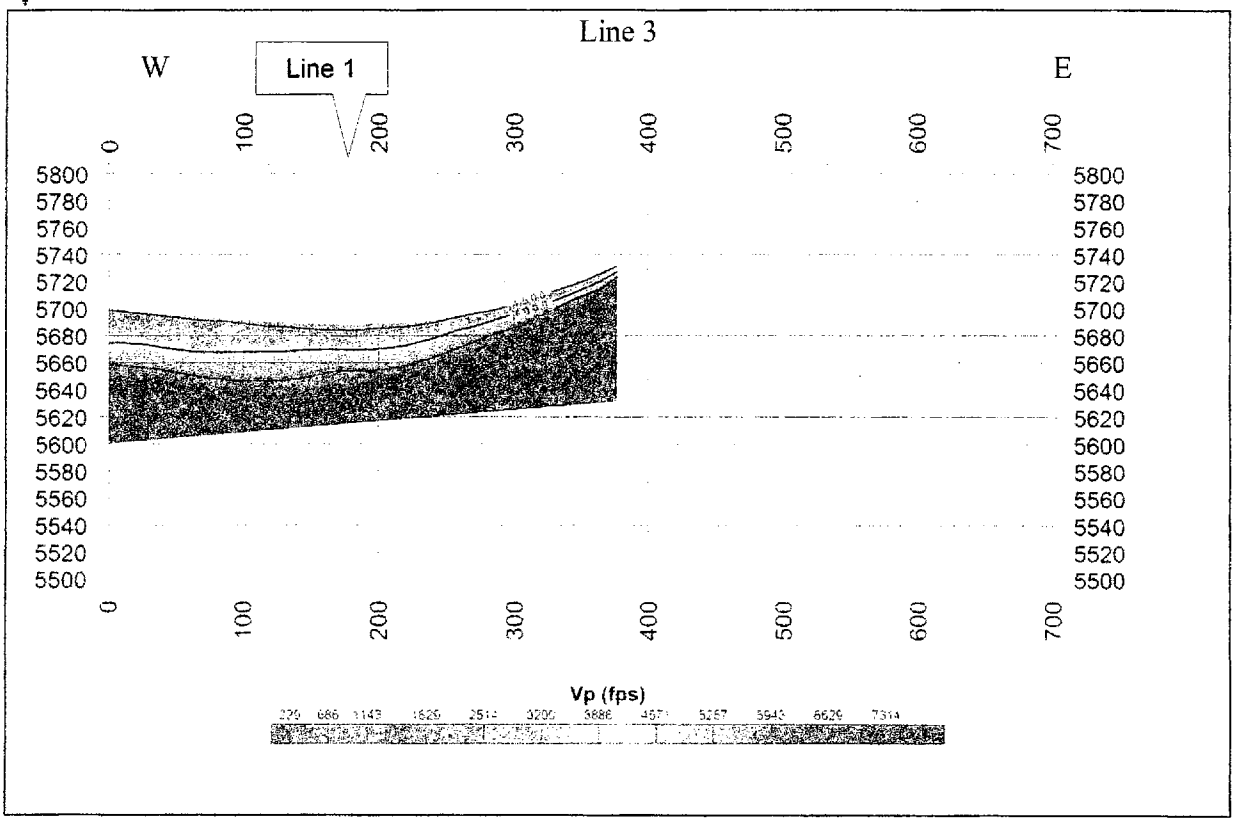
Vp (fps)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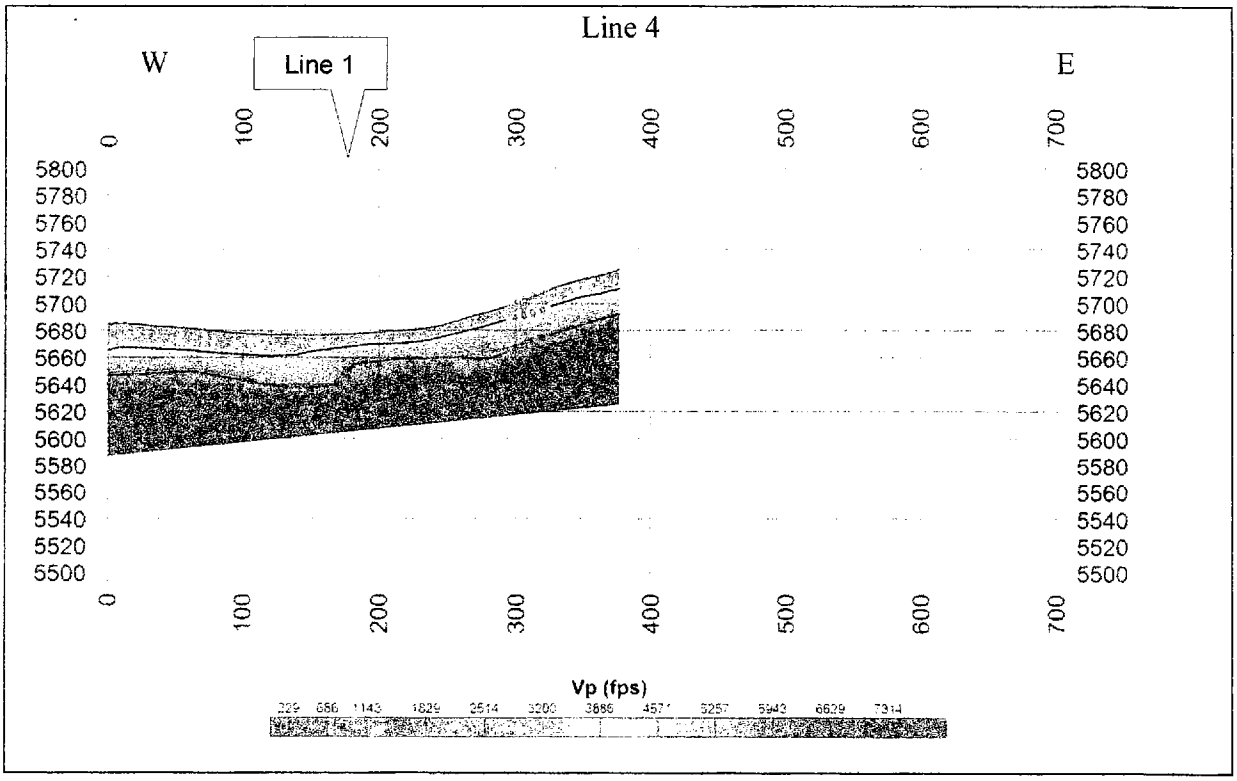
5500
Vp (fps)


Line 4
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Vp (fps)